



WP 7b
Agenda Item: 4.1.2

Person Responsible: G Hosie

**XXXIV SCAR Delegates Meeting
Kuala Lumpur, Malaysia, 29-30 August 2016**

Life Sciences Action and Expert Group Reports

Action Groups:

- Antarctic Near-shore and Terrestrial Observing System* (ANTOS)
- **Integrated Science for the Sub-Antarctic (ISSA)**
- **Southern Ocean Acidification****
- Animal monitoring via remote sensing** (Remote Sensing)

Expert Groups:

- Antarctic Biodiversity Informatics (ABI)
- Birds and Marine Mammals (BAMM)
- Continuous Plankton Recorder (CPR)
- Joint Expert Group on Human Biology and Medicine (JEGHBM)

* Sponsored by SSG-GS, SSG-LS and SSG-PS

** Co-sponsored by SSG-LS and SSG-PS

As of 18 July 2016:

Reports from Groups not submitted to the Secretariat are in red and not included in this document.



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Responsible:

ANTOS

LS

S. Craig
Cary and
Vonda
Cummings

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Kuala Lumpur, Malaysia, 29-30 August 2016**

Antarctic Near shore and Terrestrial Observation System (ANTOS)

Contacts: (name and email)

Craig Cary - caryc@udel.edu

Vonda Cummings - Vonda.Cummings@niwa.co.nz

Activities from 2014-2016

August 2014: A committee was elected at a workshop held at the SCAR OSC (Auckland); this was attended by 43 people from 10 nations. Following this meeting we proposed and were granted permission to establish an SCAR Action Group to further develop the idea of ANTOS.

ANTOS sits primarily within the SOG-LS, but is a cross-disciplinary project involving SOG-PS and SOG-GS. The Chairs are Craig Cary, New Zealand (primary) and Vonda Cummings, New Zealand (co-chair). Committee members include Dana Bergstrom, Australia; Megumu Tsujimoto, Japan (Secretary); Emmanuelle Sultan, France; Soon-Gyu Hong, Korea (Data management advisor); Charles Lee, NZ (Technical); and Elie Verleyen, Belgium.

August 2015: A workshop was held to develop an implementation plan for ANTOS. The workshop was attended by 25 researchers from 12 countries (Australia, Belgium, Chile, France, Germany, Italy, Japan, Korea, NZ, Sweden, UK, USA) and was supported through funds from the New Zealand Antarctic Research Institute (NZARI), AntEco, and the University of Waikato, New Zealand where the meeting was hosted.

A full report summarising the activities and outcomes of the meeting was produced, and is available on the ANTOS website (<http://www.scar.org/antos/antos-publications>).

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.



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We recommend that in order to become established ANTOS becomes a Task Group with an extended life span (≥ 4 years). This was a recommendation from the August 2015 workshop. We assume that this will require both a vote and approval.

Date/Year Group Approved: August 2014

Date/Year Group is to End: December 2016

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y

Further Details:

Major Activities and Significant Progress from past 2 years

August 2015 workshop:

Key characteristics of locations, parameters to measure, frequencies, scales and gradients of measurement, and the technical requirements of the system were discussed (i.e., what do we need to measure and monitor in order to detect change, where do we need to do this, and how?). The strong consensus was for locations that share basic characteristics of (a) representative biodiversity for the region concerned, (b) environmental features likely to be informative in a context of change studies, and (c) the practicality of access and working conditions. A 3-tiered approach both to platform complexity and cost was recommended, to enable wide national programme involvement and achievement of the scientific goals. At all tiers, biologically relevant attributes of change need to be assessed within six broad criteria (physical environment, colonisation, diversity, distribution, functional and genetic).

KOPRI (Soon-Gyu Hong) agreed to develop the database and data management and access plan for ANTOS. A data base sub-committee was



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established, comprised of Stefano Schiaparelli/Drew Lohrer (Italy/NZ; marine), Craig Cary/Charlie Lee (both NZ; terrestrial), Fraser Morgan (NZ; database design), and Adrian McDonald (NZ; statistics). We anticipate that the ANTOS database will be designed and established to allow easy access to the real-time data that is intimately linked to existing databases and follows internationally accepted protocols. This is huge step forward for ANTOS and will certainly enable the way forward for the programme.

Pilot deployments:

Two pilot Tier 1 terrestrial installations were deployed at Cape Adare in Northern Victoria Land in summer 2015/16. One of these units is fully telemetered and has been providing a continuous data stream since deployment. In conjunction with these installations a comprehensive biodiversity survey of the immediate area has been carried out as suggested in the ANTOS protocols. Also in summer 2015/16, pilot coastal marine ANTOS Tier 1 and 2 installations were deployed in Terra Nova Bay (Korean, Italy, NZ).

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

We request that ANTOS advances to a Task Group, to allow sufficient time and resources for its implementation. The strength of ANTOS is its (i) unification of researchers over the necessity for, and the extreme value of, a long-term vision for observation systems to understand biological systems in a changing environment, and (ii) the continent-wide approach. With KOPRI agreeing to develop and house the database we are now in a very good position to see this happen.

Actions include:

- A workshop at the Kuala Lumpur OSC, August 2016, to set tasks and timelines for final development and implementation.
- An international survey of scientists to scope areas they think are the best for long-term monitoring of environmental change. This will provide information on datasets currently in existence, what is being measured, length of records, etc. The aim of this will be get input on the most scientifically and biologically appropriate areas to target for ANTOS around the continent.



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Timeline:

We have two immediate tasks – to establish the Task Group (August 2016), and to conduct the scientific survey (August to December 2016). While we anticipate annual workshops will occur over the Task Groups' duration, other milestones will be determined in consultation with the wider ANTOS community (e.g., at the 2016 KL SCAR OSC).

Proposed Budget for 2017 and 2018

This will be decided on at the OSC ANTOS workshop in KL – this is just a projection.

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
July 2017	Technical Workshop	10,000	Craig Cary	caryc@waikato.ac.nz
June 2018	Database development	10,000	Craig Cary	caryc@waikato.ac.nz

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

The location of the technical workshop has not been determined yet as we will likely host the event central to those wishing to attend. Most if not all of the support will go to those needing support to attend including early career and countries with small Antarctic Programmes. If you look at our 2015 workshop – 80% of the funds went to these participants.

External Linkages – Support and Coordination beyond SCAR:

The New Zealand Antarctic Research Institute was the major sponsor of the August 2015 workshop, through an NZARI Type C grant.

Recognition of its importance and approval by national programmes will be key to the success of ANTOS. Therefore, one important goal as a new Task Group would be to connect more formally with COMNAP. The strength of ANTOS is its (i) unification of researchers over the necessity for and the extreme value of a long-term vision for observation systems to understand biological systems in a changing environment, and (ii) the continent-wide approach. Given the value of the information generated by ANTOS in



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informing policy and management of the region at national and international levels, we consider that COMNAP should be integrally involved in the development of ANTOS, to help ensure its long term viability. At the KL SCAR OSC meeting we will make every effort to have COMNAP representatives at the meeting.

Please describe your outreach, communication and capacity building activities:

At this point in with the ANTOS Action Group we have relied on our website and a SCAR sponsored list server to communicate with our members. We have also prioritized support of early career researchers with our limited funding (e.g. via travel grants).

Should we morph into an Task Group, we anticipate the website will be developed more extensively. We would also encourage further participation of young scientists and nations, as well as an equal gender balance, within ANTOS.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

August 2015 Workshop Report (<http://www.scar.org/antos/antos-publications>).

As part of SCAR's Capacity Building efforts, such as the Fellowships and Visiting Professor Awards, we are looking for people from all the SCAR groups to act form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications.

Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.

S. Craig Cary, University of Waikato, New Zealand
Vonda Cummings, NIWA, New Zealand
Charles Lee, University of Waikato, New Zealand



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Webpages:

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Please include any updates for your website below:

On the 'membership' page, please include this text:

"If you are interested in joining ANTOS, sign up to the list server circulation list HERE (antos-owner@lists.scar.org)."

Also include a list of the chairs and committee members.

Always the last thing to be addressed. We have a person who has agreed to do the web development. We will make sure that this has been done by the OSC.

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Craig	Cary	Uni. Of Waikato	NZ	caryc@waikato.ac.nz	8/14	8/16
Vonda	Cummings	NIWA	New Zealand	Vonda.Cummings@niwa.co.nz	8/14	8/16

S. Craig Cary -



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Bio: His research interests lie in the comparative physiology, biochemistry and ecology of marine and terrestrial microbial communities, with a focus on deep ocean geothermal and Antarctic terrestrial systems. Most recently his lab has focused on the use of high through-put genomic and metagenomic approaches to resolve biochemical adaptations for life in these extreme geochemical environments. In addition to the extremophile work he also is involved in the development of advanced genetic probing technologies for detect and enumerate bacteria and toxic harmful algal bloom species in the environment. A primary focus of both programs is the interfacing of new bioinformatic capabilities with genomic technologies specifically in metagenome analysis of complex microbial communities. The local environmental work has an emphasis in the development biometrics to assess ecosystem health. He currently leads a large laboratory at the University of Waikato in New Zealand, with a continued joint position at the University of Delaware, USA.

Web: <http://sci.waikato.ac.nz/about-us/people/caryc>



Other members

Committee:

Dana	Bergstrom	AAD	Aus	dana.bergstrom@aad.gov.au	8/14	8/16
Megumu	Tsujimoto	Japan	Japan	megumutsujimoto@gmail.com	8/14	8/16
Soon Gyu	Hong	KOPRI	Korea	polypore@gmail.com	8/14	8/16
Charles	Lee	Uni. Of Waikato	NZ	cklee@waikato.ac.nz	8/14	8/16
Emmanuelle	Sultan	National	France		8/14	8/16



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		History Museum				
Elie	Verleyen	Uni. of Ghent	Belgium	Elie.Verleyen@UGent.be	8/14	8/16
Byron	Adams	Bringham Young Uni.	USA	byron_adams@byu.edu	8/14	8/16

Also see the ANTOS list server for a more extensive list of interested researchers.



SCAR Group	Remote Sensing
SSG	PS + LS
Person Responsible:	H.-U.Peter

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Action Group on Remote Sensing

Contacts: Hans-Ulrich Peter <bpe@uni-jena.de>

1-2 paragraph summary of activities from 2014-2016

- Organizing workshops/sessions during the SCAR Open Science Conferences 2014 and 2016
- Organization and implementation of Action group-meetings during the SCAR conferences 2014 and 2016

Recommendations that Delegates and Chief Officers should consider (if any):Please indicate if voting/approval is necessary or if they are just asked to note information.

Date/Year Group Approved: 2013
Date/Year Group is to End: 2018ff?

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y



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Further Details:

Major Activities and Significant Progress from past 2 years

Organizing workshops/sessions during the SCAR Open Science Conferences 2014 and 2016

2014: 27.August. „Remote Sensing of the Antarctic Environment“ with 12 talks (Convener: Peter Fretwell , Michelle LaRue and Hans-Ulrich Peter) AG gave financial support for young scientists

2016: 22. and 23.August: Session 21: Remote sensing of the Antarctic environment: Multidisciplinary Advances: Convener : Hong Tat Ewe, Shridhar Jawak, Rob Massom, Oscar Schofield & Hans-Ulrich Peter

. 20 talks and 16 poster presentations. One young scientist will get financial support from the Action Group

Organization and implementation of Action group-meetings during the SCAR conferences 2014 and 2016

25.8.2014

- Discussion about the use of an international Database to collect penguin breeding pair data . One possibility could be PANGAEA.
- First discussion about rules for using Drones to determine the size of bird colonies and seal concentrations. First results for penguins were presented.
- Informations about new satellites

20.08.2016

This is a joint meeting of the SCAR Action Group on remote sensing of animals and the new SOOS working Group Censusing Animal Populations from Space (CAPS). Half of the day will be devoted to SCAR Action Group business, and half to discussing the CAPS pack-ice seal census project.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years



SCAR Group **Remote Sensing**
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 Person H.-U. Peter
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The AG will follow the future developments: Recent technology in geospatial science over the last decade have motivated major advances in our understanding of the Antarctic continent and surrounding oceans. These developments have (and will) included the use of new satellite remote sensing platforms (e.g. WorldView and Landsat series of satellites) and methods to obtain geospatial information, such as, automatic/ semi-automatic extraction of information from remote sensing images, new mapping techniques for ice sheet properties (roughness, thickness and velocity) usage of remotely sensed data for Antarctic glaciological and mass balance studies and ice sheet flow and geodynamics over short temporal scales. Other important points are remote sensing of the marine cryosphere (including sea ice and its snow cover) and its interactions with ocean and atmosphere and generation of digital elevation models (DEMs) of Antarctic regions.

The fast developments in monitoring bird and seal populations and habitats with remote sensing applications used unmanned aerial vehicle (UAV) including disturbance capability and environmental impacts of UAVs on bird and seal populations.

Another development is the use of Autonomous Underwater Vehicle (AUV) technology to investigate small-scale characteristics and changes. Much of this research is cross-disciplinary in its nature and this has led to noteworthy advances across a range of Antarctic scientific disciplines.

The Action Group will focus in the future on such multi-disciplinary research and includes new and emerging research frontiers in Antarctic science. The AG will merge snow and ice studies with climate research, ice-ocean interaction, and animal monitoring via remote sensing. The next meeting will be during SCAR Biology in Belgium (2017) and SCAR/IASC Conference in Davos (Switzerland) 2018.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
08/2017	Travel for young scientist to SCAR Biology in Belgium	900	Peter, H.-U.	bpe@uni-jena.de
06/2018	Travel for young scientist to SCAR/IASC Conference	1100	Peter, H.-U.	bpe@uni-jena.de



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Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

For early career scientists: 100%

External Linkages – Support and Coordination beyond SCAR:
ATCM, CEP, CCMLR, COMNAP, IAATO

Please describe your outreach, communication and capacity building activities:

Results (on disturbance data by drones) will be used by CEP for rules to use drones near bird and seal concentrations.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

Casanovas, P., Black, M., Fretwell, P., & Convey, P. (2015). Mapping lichen distribution on the Antarctic Peninsula using remote sensing, lichen spectra and photographic documentation by citizen scientists. *Polar Research*, 34(0). doi:10.3402/polar.v34.25633

Fretwell, P. T., & Trathan, P. N. (2009). Penguins from space: Faecal stains reveal the location of emperor penguin colonies. *Global Ecology and Biogeography*, 18(5), 543-552. doi:10.1111/j.1466-8238.2009.00467.x

Fretwell, P. T., LaRue, M. A., Morin, P., Kooyman, G. L., Wienecke, B., Ratcliffe, N., Trathan, P. N. (2012). An Emperor Penguin Population Estimate: The First Global, Synoptic Survey of a Species from Space. *PLoS ONE*, 7(4). doi:10.1371/journal.pone.0033751

Fretwell, P. T., Staniland, I. J., & Forcada, J. (2014). Whales from Space: Counting Southern Right Whales by Satellite. *PLoS ONE*, 9(2). doi:10.1371/journal.pone.0088655



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Goebel, M. E., Perryman, W. L., Hinke, J. T., Krause, D. J., Hann, N. A., Gardner, S., & Leroi, D. J. (2015). A small unmanned aerial system for estimating abundance and size of Antarctic predators. *Polar Biol Polar Biology*, 38(5), 619-630. doi:10.1007/s00300-014-1625-4

LaRue, M. A., Kooyman, G., Lynch, H. J., & Fretwell, P. (2014). Emigration in emperor penguins: Implications for interpretation of long-term studies. *Ecography*, 38(2), 114-120. doi:10.1111/ecog.00990

Lynch, H. J., & LaRue, M. A. (2014). First global census of the Adélie Penguin. *The Auk*, 131(4), 457-466. doi:10.1642/auk-14-31.1

Rümmeler, M., Mustafa, O., Maercker, J., Peter, H., & Esefeld, J. (2015). Measuring the influence of unmanned aerial vehicles on Adélie penguins. *Polar Biol Polar Biology*. doi:10.1007/s00300-015-1838-1

Schwaller, M. R., Southwell, C. J., & Emmerson, L. M. (2013). Continental-scale mapping of Adélie penguin colonies from Landsat imagery. *Remote Sensing of Environment*, 139, 353-364. doi:10.1016/j.rse.2013.08.009

Zmarz, A., Korczak-Abshire, M., Storvold, R., Rodzewicz, M., & Kędzierska, I. (2015). Indicator Species Population Monitoring In Antarctica With Uav. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci. ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XL-1/W4, 189-193. doi:10.5194/isprsarchives-xl-1-w4-189-2015

As part of SCAR's Capacity Building efforts, such as the Fellowships and Visiting Professor Awards, we are looking for people from all the SCAR groups to act form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications.

Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.

Please ask me;: Hans-Ulrich.Peter@uni-jena.de

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below: **(will follow later)**



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If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Hans-Ulrich	Peter	Polar and Bird Ecology Group Jena	Germany	bpe@uni-jena.de	2014	2018

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.



birth: 15. March 1952 in Jena / Germany

1970 study of biology at Jena University
 1974 diploma-thesis and examination (Institute of Ecology)
 1974-78 field work in the Nature Reserve „Leutratal“
 1979 doctoral-thesis and examination : summa cum laude
 since 1979 scientist at the Institute of Ecology, Jena University
 special fields: polar & bird ecology and systematics
 teaching experience in zoology, ecology, natural protection etc.
 1983-85 first Antarctic expedition to King George Island (18 month)
 since 1992 Head of the Polar & Bird Ecology Group
 at the Institute of Ecology, Jena University
 since 1990: 26 summer expeditions to the Antarctic (as Exp. leader),
 five summer expeditions to the Arctic



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research projects: impact of climate change and direct anthropogenic factors on penguins and other seabirds, Population ecology of skuas,
2006 - 2012: Consultant for the Ministry for Environment, the Ministry for Foreign Affairs and the Federal Environmental Agency in Antarctic questions

Further specifications

- Member of the Scientific Board of the “German Polar Society”
- Formerly Member of SCAR Expert Group on Birds and Marine Mammals
- Chair of the SCAR Action Group Remote Sensing since 2014
- Member of SCAR Scientific Standing Group ”Life Science”
- Member of Editorial Board for „Journal of Ornithology“ and other journals
- Referee for „Polar Biology“, “Marine Ecology”, „Journal of Ornithology“, DFG, Academic editor for “PlosOne”

Other members

First Name	Last Name	Affiliation	County	Email
Heather	Lynch	Stony Brook University	USA	<heather.lynch@stonybrook.edu>
Michelle	La Rue	University of Minnesota	USA	<larue010@gmail.com>
Peter	Fretwell	BAS	UK	<ptf@bas.ac.uk>
Osama	Mustafa	Think	Germany	<osama.mustafa@think-jena.de>
Ewe	Hong Tat	Universiti Tunku Rahman	Malaysia	<eweht@utar.edu.my> ,
Shridhar	Jawak	Nat.Centre for Antarctic and Ocean Research	India	<shridhar.jawak@gmail.com> ,
Rob	Massom	Australian Antarctic Division	Australia	<Rob.Massom@aad.gov.au>
Oscar	Schofield	Rutgers University	USA	<oscar@marine.rutgers.edu>
Mathew	Schwaller	NASA Goddard Space Flight Center	USA	mathew.r.schwaller@nasa.gov



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Malgorzata	Korczak-Abshire	Polish Academy of Sciences	Poland	mka@ibb.waw.pl
Paul	Morin	Polar Geospatial Center	USA	lpaul@umn.edu
Marie-Charlott	Rümmeler	Jena University	Germany	marie-charlott.ruemmler@uni-jena.de
Barbara	Bollard Breen	Auckland University of Technology	New Zealand	bbreen@aut.ac.nz



SCAR Group xxx
SST PS/LS/GS
Person xxx
Responsible:

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Antarctic Biodiversity Informatics Expert Group

Contacts:

Bruno Danis, bdanis@ulb.ac.be
Ben Raymond, Ben.Raymond@aad.gov.au

1-2 paragraph summary of activities from 2014-2016

The Expert Group on Antarctic Biodiversity Informatics has been involved in a series of projects and developments pertaining to the exploration of complex data to delineate patterns in ecological, biogeographic or taxonomic processes. The projects ABi was involved in include:

- The Biogeographic Atlas of the Southern Ocean (BASO)
- The Register of Antarctic Marine Species (RAMS), now expanding to terrestrial and limnetic realms
- The microbial Antarctic Resources System (mARS)
- The Retrospective Analysis of Antarctic Tracking Data (RAATD)

Its members have and participated in several workshops dedicated to these projects, and met remotely on several occasions.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

Date/Year Group Approved:

Date/Year Group is to End:

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y



SCAR Group xxx
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Person xxx
Responsible:

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Further Details:

Major Activities and Significant Progress from past 2 years

The various projects ABI members were involved with have made steady progress, but are all long-term developments that are mostly based on in-kind support. Thanks to SCAR funding, the core people involved in these projects are able to meet regularly and make progress.

A lot is also happening at the level of liaison with other SCAR-linked initiatives, such as SOOS, EG-BAMM, AntERA, AntECO, SCADM,... through multiple participations by our EG members.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

Development/deployment of a Register of Antarctic Species

Further advances in the dynamic version of the BASO

Further advances in the mARS initiative

General support to digitization and sharing of raw Antarctic biodiversity data

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
07/2017	Support for an ABi workshop	7000	Bruno Danis	bdanis@ulb.ac.be

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programs):

75% to support early career scientists to bring in new perspectives in recent development in biodiversity informatics.

External Linkages – Support and Coordination beyond SCAR:



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Please describe your outreach, communication and capacity building activities:

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Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.

Bruno Danis (Chair, Université Libre de Bruxelles)
Ben Raymond (Secretary, Australian Antarctic Division, Australia)
Huw Griffiths (British Antarctic Survey, United Kingdom)
Alison Murray (Desert Research Institute, USA)
Anton van de Putte (Royal Belgian Institute of Natural Sciences, Belgium)
Yan Ropert-Coudert (Centre national de la recherche scientifique, France)



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

**XXXIV SCAR Delegates Meeting
Kuala Lumpur, Malaysia, 29-30 August 2016**

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

We can update the webpage directly using the SCAR website's CMS.

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Bruno	Danis	Université Libre de Bruxelles	Belgium	bdanis@ulb.ac.be	July 2013	

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.

Other members

Ben Raymond (Secretary, Australian Antarctic Division, Australia)
Anne-Sophie Archambeau (Muséum national d'Histoire naturelle, France)
Horst Bornemann (Alfred Wegener Institute, Germany)
Claude De Broyer (Royal Belgian Institute of Natural Sciences, Belgium)
Huw Griffiths (British Antarctic Survey, United Kingdom)
Alison Murray (Desert Research Institute, USA)
Anton van de Putte (Royal Belgian Institute of Natural Sciences, Belgium)
Yan Ropert-Coudert (Centre national de la recherche scientifique, France)
Jose Xavier (University of Coimbra, Portugal)

14/07/2016

EGBAMM Annual Report to the SCAR

2015-2016

Mark Hindell and Yan Ropert-Coudert on behalf of the EGBAMM group

The group has continued to be active during 2015 and 2016, and reports on the EG-BAMM working groups are presented below. The group has also participated in several international fora, such as CCAMLR and SOOS, as well as being part of several SCAR programs, most notably SCATS, ANT-Eco and ANT-Era. For the latter, the group was represented at the Tri-SRP meeting in Barcelona in September 2015. EG-BAMM also participated to the elaboration of articles for the Antarctic Environment Portal (Information paper “Vulnerability of Southern Ocean biota to climate change”, by Gutt et al.).

We have experienced increasing demand for EG-BAMM to coordinate tag and band re-sights. In 2015-16, besides requests for expertise by editors or journalists, we responded to number of request to identify marked seals and whales. By circulating photos to the broad EG-BAMM membership we were able to successfully identify the individual animals. This is an important scientific and also outreach activity, as often the re-sights are made by members of the public. Due to increasing demand for this capacity and the time constraints it imposed on the group, Monica Muelbert, Mark Hindell and Yan Ropert-Coudert are planning to initiate an on-line tag re-sight portal as part of the EG-BAMM web page with the help of an IT engineer who will be specifically hired for this occasion.

Below are the specific reports for the different working groups/activities that are part of EG-BAMM:

A. RETROSPECTIVE ANALYSIS OF ANTARCTIC TRACKING DATA

PI: Mark Hindell (University of Tasmania, Australia).

The major activity of the RAATD group was the workshop held in Delmenhorst, Germany in April 2016. The workshop was hosted by the Hanse-Wissenschaftskolleg, and convened by Horst Bournemann from AWI. The workshop (full report attached separately) was extremely successful, bringing together biologists, statisticians and database experts to work together on the RRATD data, which now consists of more than 3000 individual animal tracks from 14

species. This work shop saw important refinements to the data management, initial quality control of tracks and development of an analytical framework to provide input to statistical models. The next meeting of the RAATD group will be in Kuala Lumpur, where we will discuss developments since Delmenhorst, which have seen the development of statistical models, and their application to a subset of species, cross validation of the models to help decide on the most appropriate model structure and the production of preliminary global habitat maps for Adeline Penguins and Black-browed albatross. The RAATD work has attracted CESAB funding which will support 4 more international workshops in France over the next two years, as well as a full time post-doc to work on the project.

B. WG HEALTH MONITORING

PI: Andrés Barbosa (Natural History Museum, CSIC, Spain)

Activities carried out by the WG since its creation in the 2014 SCAR meeting in Auckland:

- 1) Several members of the WG were commissioned to collaborate with Antarctic Environments Portal (www.environments.aq) writing a paper about Antarctic wildlife diseases that was published in the Information Summary section at the end of 2015. In this paper is summarized all the information published about pathogens and diseases present in Antarctic birds and marine mammals and about mass mortality events in Antarctica as well. Some suggestions about future research work and surveillance were given.
- 2) The WG in collaboration with the University of Macquarie organized a workshop entitled "Antarctic microbial/parasite impacts" that was held on 2-7 August 2015 in Sydney (Australia). In this workshop the published information on parasites and pathogens of Antarctic wildlife was reviewed and research gaps and future prospective was discussed. Several outputs from this workshop are as follows: i) A review paper about macro-parasites in penguins has been submitted to Parasitological Research Monographs; ii) Two more papers will be submitted soon about microbes and Antarctic wildlife, one reviewing the published information and another conceptual paper focused in the role of microbes in Antarctic wildlife; iii) We will contribute to the OSC SCAR 2016 conference in Kuala Lumpur with a poster entitled "Current knowledge of Antarctic wildlife pathogens: identification of gaps and opportunities for research"; iv) We will contribute to the International Albatross and Petrels conference to be held in Barcelona (Spain) in September 2016 with a poster entitled "A review of the parasites of Antarctic albatrosses and petrels".
Information about these items will be presented at the EG-BAMM meeting in Kuala Lumpur SCAR meeting.

Future work:

- The WG think that it is necessary to move forward a proposal about disease surveillance of Antarctic wildlife. Following this, two actions are proposed:
 - 1) As an output from the Sydney workshop and linked with one of the deliverables proposed by the WG, there is a proposal to organize an open workshop on disease and Antarctic wildlife considering the 20 years since the organization of the 1998 workshop of Antarctic wildlife diseases in Australia. The recommendations give in the 1998 workshop will be reviewed. The workshop probably will be held in Australia although this is still an open question. Alternatively it could be organized in coincidence with the 2018 SCAR meeting in Davos (Switzerland).
 - 2) An exploratory activity based on “citizen science” involving tourists visiting of wildlife aggregations which will be asked for sending pictures of animals with an abnormal aspect. This will allow reaching two goals: a) to detect some diseases like the feather loss disease; and b) to outreach the importance of the disease effects of in Antarctic wildlife and the environmental conservation to the tourists.
 - 3) This action will be also extended to scientists working with Antarctic wildlife but without expertise in this issue.
 - 4) To propose the creation of an Adélie penguin network about disease and health parameters using this penguin as a sentinel species for health surveillance. Adélie penguin is distributed for almost the entire continent and can be considered as an ideal species for achieving this goal. We will contact with research groups working with this species to discuss the extent they could participate in the network and how.

C. WG TROPHIC INTERACTIONS

PI: Jose Xavier (University of Coimbra, Portugal)

The trophic interactions group is focusing on advancing on the crustacean guide for the Southern Ocean. The developmental stages for the guide include: Step 1. Review of importance of crustaceans in top predators from the southern ocean (done); Step 2. Assess the most importance crustacean species and evaluate their distribution, allometric equations, relevance in top predators diets and identification features (done); Step 3. Send to crustacean experts for update; the various sections are being reviewed now by contributors (ongoing).

Another activity of the trophic interactions WG is the Stable Isotope database. Work in progress led by Luis Huckstadt (Univ. Santa Cruz, USA). There are on-going discussion regarding how to integrate with the Australian Antarctic Data Center's existing database. The University of Tasmania's Antarctic Gateway project is also interested in working with EG-BAMM to develop a comprehensive, open-access data base of prey isotope values, so this promises to be a very valuable product for our group.

D. WG EDUCATION AND OUTREACH

PIs: Jose Xavier and Mary-Anne Lea (University of Tasmania, Australia)

The WG has been very busy and has contributed a number of papers to ATCM, as well as attending several important events. These are detailed below:

- Papers to ATCM

2015 – Bulgaria, Belgium, Brazil, Chile, Portugal and United Kingdom. Co-chairs' report of the workshop on Education, Sofia, Bulgaria, May 2015. ATCM XXXVIII/WP52 (José Xavier was the contributor from Portugal)

2015 – Bulgaria, Belgium, Brazil, Chile, Portugal, United Kingdom. Report on the ATCM XXXVIII Workshop on Education and Outreach. ATCM XXXVIII/BP26 (José Xavier was the contributor from Portugal)

2015 – Portugal. Portugal's Antarctic education and outreach activities. ATCM XXXVIII/IP2 (José Xavier was the contributor from Portugal)

- Events

2015 – Bulgaria, Belgium, Brazil, Portugal and UK (J. C. Xavier was Portugal representative + Chair). Workshop on Education and Outreach of the Antarctic Treaty Consultative Meeting, Sofia (Bulgaria). 29 May- 10 June 2015.

2015 - Fugmann, G., Engelbertz, S., Trifinova, I., Lourenço, S., Putte, Van de, Pulsifer, P., Vick-Majors, T. & Xavier, J. C. I APECS World Summit. 6-8 June 2015 (J.C. Xavier as co-organizer + invited speaker + discussion panelist)

2015 – Beck, I., Lehmann, R., Xavier, J. C. and Huffman, L.. Education meets science: bringing polar research into the classrooms. International Polar Education workshop. Hannover 1-4 April 2015 (J.C. Xavier as co-organizer + invited speaker)

- Activities with Schools

Working closely with Polar Educators International (PEI) and Association of Polar Early Career Scientists (APECS), on the International educational activity POLAR WEEKS (used to promote EGBAMM related research).

Talks by J. C. Xavier (2015). Science talks on polar research in schools or events from Portugal (invited talks: I Fair of Oliveira do Bairro (5000 people, mostly from nearby schools; member of the scientific committee, coordinator of the representation of MARE-UC, coordinator of educational activities with Patricia Azinhaga and Jose Seco, discussion panelist), Agrupamento

de Escolas de Oliveirinha (3 trips to this school), EB+S Lanheses (4), Escola João Roiz (Castelo Branco), EB Cantanhede (2), EB Mira (2), EB Alcobaça (3), EXPLORATÓRIO, Ciência Viva Romulo de Carvalho (2), Instituto Escolar de Souselas (2), Fundação ADFP (Miranda do Corvo), Centro de Ciência Viva de Bragança, Centro Escolar da Sé (Bragança), El Corte Ingles, ES Maria Amália Vaz de Carvalho, ES Vila Real de Santo António, EB e S Argo e Lima (4), Centro Escolar de Alcobaça, Centro Escolar de Benedita and skype calls to USA (2), Uruguay (1), Brazil (1) and Portugal (7; from the Antarctic).

We are already planning next year's workshop for educators, with PEI, in April 2017 (Italy).

E. WG ON REMOTE SENSING

PI: Hans-Ulrich Peter (University of Jena, Germany)

The main report for this group will be submitted separately as the Action group on Remote sensing. However it is important to note here that at the 2015 SOOS planning workshop a new working group "Censusing Animal Populations from Space (CAPS)" was formed. CAPS shares many members with EG-BAMM, and it will hold a joint meeting with SCAR at the Kuala Lumpur meeting in August.

EG-BAMM BUDGET REQUEST 2017:

- 1- Support for CO to attend SCAR Biology in 2017 in Brussels: \$4500
- 2- Support for WG Wildlife Diseases to host workshop in 2017: \$3000
- 3- Support for additional EG-BAMM member to attend SCAR Biology in 2017: \$3000
- 4- IT support to develop tag database/isotope database: \$2000

Total: \$12500

SOME RELEVANT PUBLICATIONS FROM THE GROUP:

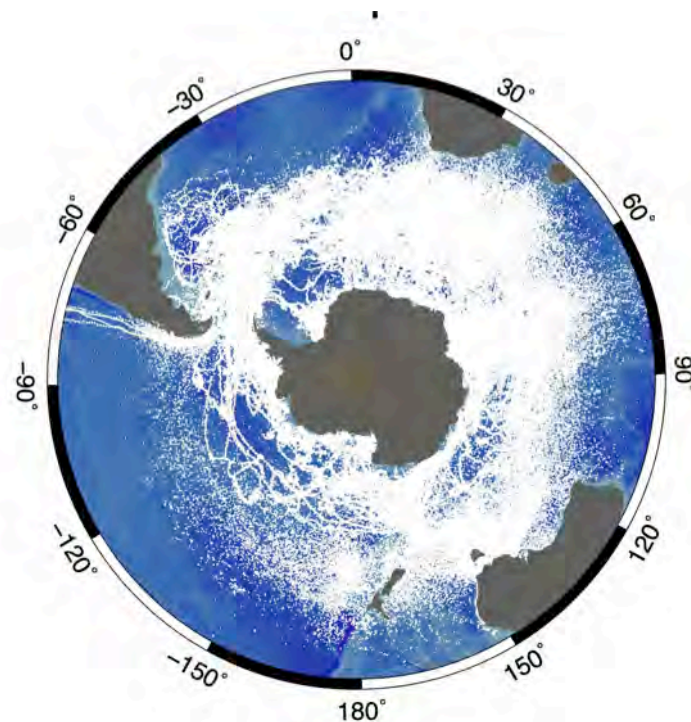
- Xavier, J. C., Brandt, A., Ropert-Coudert, Y., Badhe, R., Gutt, J., Havermans, C., Jones, C., Costa, E. S., Lochte, K., Schloss, I. R., Kennicutt, C., & Sutherland, W. J. (2016). Future challenges in Southern Ocean life and ecology research. *Frontiers in Marine Science* DOI: 10.3389/fmars.2016.00094
- Kennicutt II, M. C., Chown, S. L., Cassano, J. J., Liggett, D., Massom, R., Peck, L. S., Rintoul, S. R., Storey, J. W. V., Vaughn, D. G., Wilson, T. J., Allison, I., Ayton, J., Badhe, R., Baeseman, J., Barrett, P. J., Bell, R. E., Bertler, N., Bo, S., Brandt, A., Bromwich, D., Cary, C., Clark, M. S., Convey, P., Costa, E. S., Cowan, D., DeConto, R.,

- Dunbar, R., Elfring, C., Escutia, C., Francis, J., Fricker, H. A., Fukuchi, M., Gilbert, N., Gutt, J., Havermans, C., Hik, D., Hosie, G., Jones, C., Kim, Y., Le Maho, Y., Lee, S., Leppe, M., Leichenkova, G., Li, X., Lipenkov, V., Lochte, K., López-Martínez, J., Lüdecke, C., Lyons, W. B., Marensi, S., Miller, H., Morozova, P., Naish, T., Nayak, S., Ravindra, R., Retamales, J., Ricci, C. A., Rogan-Finnemore, M., Ropert-Coudert, Y., Samah, A. A., Sanson, L., Scambos, T., Schloss, I., Shiraishia, K., Siegert, M. A., Simões, J., Sparrow, M. D., Storey, B., Wall, D. H., Walsh, J. C., Wilson, G., Winter, J. - G., Xavier, J. C., Yang, H., Sutherland, W. J. (2015) A roadmap for Antarctic and Southern Ocean science for the next two decades and beyond. *Antarctic science* 27 (01): 3-18 doi:10.1017/S0954102014000674
- Xavier, J. C., Fugmann, G., Beck, I., Huffman, L. & Jensen, E. (2016). Education on biodiversity of the Polar Regions. In Castro, P., Azeiteiro, U.M., Bacelar Nicolau, P., Leal Filho, W., Azul, A.M. Biodiversity's and Education for Sustainable Development (ESD) in the series Umweltbildung, Umweltkommunikation und Nachhaltigkeit - Environmental Education, Communication and Sustainability, Peter Lang. Peter Lang GmbH International Academic Publishers Frankfurt am Main.: 43-56 SBN: 978-3-319-32317-6 (Book chapter)
 - Xavier, J. C. & Peck, L. (2015). Life beyond the ice. In Exploring the Last Continent, Liggett, D., Storey, B., Cook, Y., Meduna, V. (ed), Springer International Publishing, Switzerland: 229-252 ISBN 978-3-319-18947-5 (Book chapter)
 - Gutt J, Constable A, Cummings V, Hosie G, McIntyre T, Mintenbeck K, Murray A, Peck L, Ropert-Coudert Y, Saba GK, Schofield O, Schloss I, Stefels J, Takahashi K (2016) Vulnerability of Southern Ocean biota to climate change. Information Summary. Antarctic Environment Portal.
(<https://www.environments.aq/information-summaries/vulnerability-of-southern-ocean-biota-to-climate-change/>)
 - Hays GC, Ferreira LC, Sequeira AMM, Meekan MG, Duarte CM, Bailey H, Bailleul F, Bowen WD, Caley MJ, Costa DP, Egu  luz VM, Fossette S, Friedlaender AS, Gales N, Gleiss AC, Gunn J, Harcourt R, Hazen EL, Heithaus MR, Heupel M, Holland K, Horning M, Jonsen I, Kooyman GL, Lowe CG, Madsen PT, Marsh H, Phillips RA, Righton D, Ropert-Coudert Y, Sato K, Shaffer SA, Simpfendorfer CA, Sims DW, Skomal G, Takahashi A, Trathan PN Wikelski M, Womble JN, Thums M (2016) Key questions in marine megafauna movement ecology. *Trends in Ecology and Evolution* 31(6): 463-475
 - Raymond B, Lea MA, Patterson T, Andrews-Goff V, Sharples R, Charrassin J-B, Cottin M, Emmerson L, Gales N, Gales R, Goldsworthy S, Harcourt R, Kato A, Kirkwood R, Lawton K, Ropert-Coudert Y, Southwell C, van den Hoff J,

Wienecke B, Woehler EJ, Wotherspoon S, Hindell MA (2015) Important marine habitat off East Antarctica revealed by two decades of multi-species predator tracking. *Ecography* 38: 121-129

Report on the Second SCAR Retrospective Analysis of Antarctic Tracking Data Workshop

Hanse-Wissenschaftskolleg (HWK)
Lehmkuhlenbusch 4, 27753 Delmenhorst GERMANY
<http://www.h-w-k.de/>
4 - 8 April 2016



Attendees: Mark Hindell (Co-convenor and workshop chair), Yan Ropert-Coudert (co-convenor), Phil Trathan, Mary-Anne Lea, Horst Bornemann (co-convenor), Antonie Haas, Kerstin Jerosch, Dominik Nachtsheim, Luis Huckstadt, Ian Jonsen, Ryan Reisinger, Anton Van de Putte, Simon Wotherspoon

Video attendees: Ben Raymond

Apology: Bruno Danis



SCAR EG-BAMM and EG-ABI sponsored a second five-day workshop on the Retrospective Analysis of Antarctic Tracking Data (RAATD). The overarching goals of the RAATD project are to undertake a multi-species assessment of habitat use of Antarctic top predators in the Southern Ocean based on existing animal tracking data to identify *Areas of Ecological Significance* (AES), which are regions that are important for foraging to a range of predators and which have high diversity and abundance of lower trophic levels. The project will provide (i) a greater understanding of fundamental ecosystem processes in the Southern Ocean (ii) facilitate future projections of predator distributions under varying climate regimes and (iii) provide input into spatial management planning decisions for management authorities such as CCAMLR. The synopsis of multi-predator tracking data will also expose potential gaps of data coverage in regions or seasons that are important but under-represented, either as a result of a low regional research presence or a low ecological significance. This will provide an important input for directing future studies.

The first workshop in Brussels established a database (with associated metadata) of over 2000 individual tracks from the Southern Ocean, drawing on contributions from more than 30 data owners. The workshop also established an analytical frame work for analyses of these data to identify AES in the Southern Ocean based on existing animal tracking data.

The second meeting was hosted by the Hanse-Wissenschaftskolleg (institute for Advanced Studies) in Delmenhorst, Germany, with financial support from HWK, the Alfred Wegner Institute, Deutsche Forschungsgemeinschaft (DFG), SCAR, and Macquarie University. The participants included database specialists, spatial ecologists and statisticians with the objective to consolidate the database and to develop the habitat utilisation models (HUMs) that underpin the RAATD goals.

The meeting opened with a short overview of the project and a summary of the last RAATD meeting in Brussels by MH. There were then reports from YR-C about progress regarding the

database since the last meeting, IJ on recent developments of his state space animal movement model, SW on progress on statistical model development since the last meeting and RR describing his multi-species tracking analysis for Marion Island.

There was then a detailed discussion about the modelling approach to be adopted in light of the decisions made in Brussels and the progress made by the modelling group (BR, IJ, SW and MH) since that time. The general framework of (i) developing a habitat utilization model (HUM) for each species, (ii) using that HUM to make global predictions of important habitat based on colony locations (where appropriate) and then (iii) combining these species specific global predictions to indicate Areas of Ecological Significance was agreed.

For development of HUMs it was agreed to continue exploring at least three approaches:

1. Track-based comparison of where animals went (the actual track) with areas that were available them (a set of random tracks with similar movement characteristics to the actual track). A set of environmental variables is derived for each location (actual or random) and these are compared in a statistical model to establish those variables that best distinguish the particular areas used by the species. This is the approach used by BR and RR in their prior analyses, and can be regarded as “selectivity” model. This will be called the “track selectivity” approach.
2. The gridded comparison of actual tracks and random tracks. This is a modification of the track-based approach and combines the information for each individual and each deployment location onto spatial grids. It produces two sets of grids; an “availability” grid consisting of the number of times a track, real or random, used a grid cell, and a “usage” grid consisting of the number of times only a real track used a grid cell. Each grid is then modelled against a set of environmental variables to provide an “availability” and a “usage” model. The product of these two model outputs provides a measure of preference for each cell. This is another form of selectivity model and will be called the “gridded selectivity” approach
3. A “usage” model that only uses information from observed tracks. In this case, a region is gridded and the mean time that each track spent in each cell is calculated. These are then modelled against a set of environmental variables to determine which variables are associated with areas of high and low usage. This is termed the “gridded usage” model, and is similar to kernel density analyses commonly used with tracking data.

MH outlined the scope and objectives for this meeting before a discussion on the best way to achieve these objectives. We then divided into two working groups – the data management group and the modelling group.

The agreed objectives of the meeting were:

(i) Database Management group

1. Compile metadata records
2. Compile list of species for each of the temporal groupings (*e.g.* breeding non-breeding)

3. Identify and source missing datasets
4. Obtain a list of colony locations for all species
5. Initial quality control of datasets (pre-filtering and post-filtering data clean-up)
6. Prepare manuscript for a data paper

(ii) Data modelling group

1. Run State Space Animal Movement Models (SSAMMs) for each species
2. Generate random tracks, using parameters from the SSAMMs, to define available areas
3. Extract environmental datasets
4. Develop statistical habitat use models for each species
5. Generate spatial predictions for each species
6. Combine predictions to identify Areas of Ecological significance

Achievements of the workshop

(i) Database Management group

1. Compile metadata records

Metadata records were compiled over the week. Many inconsistencies were detected and the addition of a few new datasets meant that a near final set of homogenous and corresponding metadata and data files was not obtained before the end of the workshop. This work will continue out of session with a view to completion by the end of May. **Action Item 1**

2. Compile list of species

At the end of the workshop, the RAATD dataset contained **3447** individual tracking data files from 15 species; ten species of seabirds and five species of marine mammals. The majority of the individuals (53% of the seabirds and 95% of the marine mammals) were tracked by satellite telemetry (PTT). Five species (one marine mammal species) were tracked by GLS, while 8 out of 10 seabird species were tracked with GPS; no marine mammals were tracked using GPS technology.

Table 1: A summary of the data included in the RAATD dataset at the end of the 2016 WHK meeting. Data are summarised by the number of individuals tracked in each species, and by the tracking methodology: PTT (Argos Satellite Tracking), GPS (Geographic positioning system) and GLS (light-based geo-location).

Species	GLS	GPS	PTT	Total
<i>Aptenodytes forsteri</i>			143	143
<i>Aptenodytes patagonicus</i>		9	101	110
<i>Diomedea exulans</i>	134	104	28	266

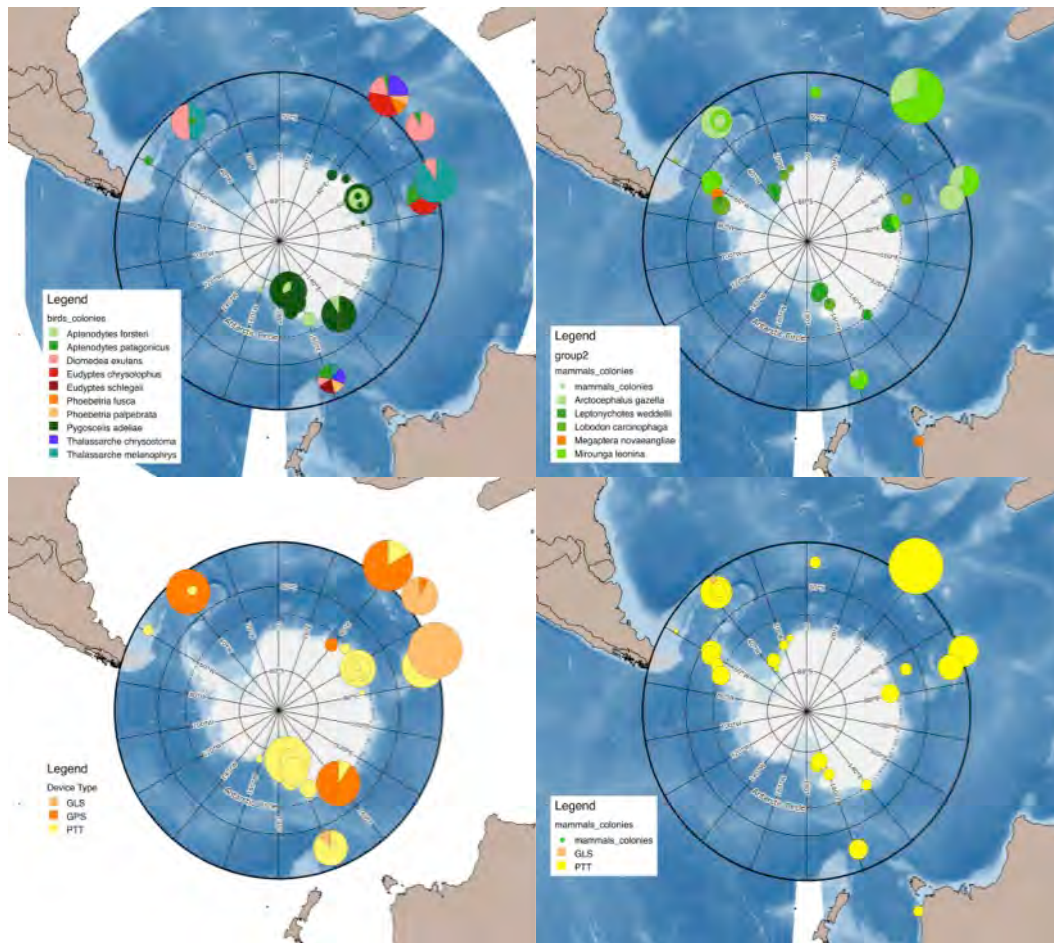
<i>Eudyptes chrysolophus</i>		75	87	162
<i>Eudyptes schlegeli</i>			20	20
<i>Phoebetria fusca</i>		23		23
<i>Phoebetria palpebrata</i>	3	10	25	38
<i>Pygoscelis adeliae</i>		166	574	740
<i>Thalassarche chrysostoma</i>	3	53	17	73
<i>Thalassarche melanophrys</i>	229	81	18	328
Total	369	521	1013	1903

Species	GLS	PTT	Total
<i>Arctocephalus gazella</i>	71	438	509
<i>Leptonychotes weddellii</i>		169	169
<i>Lobodon carcinophaga/us?</i>		105	105
<i>Megaptera novaeangliae</i>		46	46
<i>Mirounga lionina</i>		715	715
Total	71	1473	1544

RAATD has so far accumulated a grand total of **2,426,456** location fixes. 55.5% of all locations belong to the marine mammal dataset, with elephant seals locations accounting for 33.3% of the total. In the seabird group, nearly 20% of the locations are shared between Adelie penguins and wandering albatrosses.

Importantly, these data come from 37 separate data owners (Table 2), who have agreed to share their hard won data with the RAATD project.

Figure 1. Summary maps of (a) the number of bird species per deployment location, (b) the number of mammal species per deployment location, (c) the tracking methods used for birds per deployment location and (d) the tracking methods used for mammals per deployment location. The size of the circle indicates the number of individuals tracked. Please note that these are figures drawn using raw data, and will be refined as the metadata task is completed and additional tracking data added.



3. Identify and source missing datasets

Four species coordinating teams have been responsible for approaching data owners and then collating data. These were:

Phil Trathan and Yan Ropert-Courdert: Penguins

Luis Huckstadt: Weddell and Crabeater seals

Mark Hindell and Jose Xavier: elephant seals and albatross

Mary-Anne Lea: Antarctic fur seals

Several additional datasets were identified, and data owner permission obtained during and just after the workshop. Some of these were through the new Birdlife International Seabird Tracking Database (<http://www.seabirdtracking.org/>), which is proving to be an invaluable resource for RAATD. There were:

(i) Adélie Penguin data from the US AMLR Program (Jefferson Hinke and Wayne Trivelpiece), Argentina (Mecha Santos) and Japan (Akinori Takahashi) from the Antarctic Peninsula, filling an important gap in our coverage for this species.

(ii) Macaroni Penguin data from South Georgia (BAS) and from Kerguelen (France, Charly Bost), also filling important gaps for this species.

In addition, tracking data on Humpback whales were obtained with the permission to use from Luciano Dalla Rosa from the Universidade Federal do Rio Grande.

It was decided that from the end of the workshop onwards any incoming new datasets would be stored into a separate folder (RAATD_additional_datasets after April 2016) on both the Google Drive and the Dropbox folder. This would minimise confusion with existing datasets that are being pre-processed at the moment. It was also decided that the group would stop looking for new datasets from the end of May 2016. Until that date, potential new datasets to be included are:

1. White-chinned petrels - MH to contact David Thompson, Richard Phillips, Henri Weimerskirch
2. Antarctic fur seals - M-AL to contact Christophe Guinet, Andy Lowther and Akinori Takahashi for additional datasets.

Action Item 2.

Table 2: List of all 37 data owners who have contributed to RAATD so far. They come from 23 different institutions from 11 different countries

Data Owner	Organisation	Country
Akinori Takahashi	National Institute for Polar Research	Japan
Ari Friedlander	Oregon State University	USA
Barbara Wienecke	Australian Antarctic Division	Australia
Ben Raymond (on behalf of various AADC contributors)	Australian Antarctic Data Centre	Australia
Charly Bost	CEBC	France
Christophe Guinet	CEBC	France
Colin Southwell	Australian Antarctic Division	Australia
Dan Costa	University of California, Santa Cruz	USA
David Ainley	H.T. Harvey & Associates	UAS
Erling S. Norday	University of Tromso	Norway
Graham Robertson	Australian Antarctic Data Centre	Australia
Henri Weimerskirch	CEBC	France
Horst Bornemann	Alfred Wegner Institute	Germany
Iain Staniland	British Antarctic Survey	United Kingdom
Jean-Benoit Charrassin	L'Ocean	France
Jefferson Hinke	NOAA	USA
Jerry Kooyman	Scripps	USA
Karine Delord	CEBC	France
Kit Kovacs	Norwegian Polar Institute	Norway
Klemens Pütz	Antarctic Research Trust	Germany

Luciano Dalla Rosa	Federal University of Rio Grande	Brazil
Mark Hindell	University of Tasmania	Australia
Marthan Bester	University of Pretoria	South Africa
Mary-Anne Lea	University of Tasmania	Australia
Mecha Santos	Instituto Antartico Argentino	Argentina
Mike Fedak	Sea Mammal Research Unit	United Kingdom
Mike Goebel	NOAA	USA
Monica Muelbert	Federal University of Rio Grande	Brazil
Newi Makhado	Department of Environmental Affairs	South Africa
Nico De Bruyn	University of Pretoria	South Africa
Norman Ratcliffe	British Antarctic Survey	United Kingdom
Peter Boveng	NOAA	USA
Peter Ryan	Percy Fitzpatrick Institute	South Africa
Phil Trathan	British Antarctic Survey	United Kingdom
Pierre Pistorius	Nelson Mandela Metropolitan University	South Africa
Rachael Alderman	DPIPWE	Australia
Richard Phillips	British Antarctic Survey	United Kingdom
Rob Crawford	Department of Environmental Affairs	South Africa
Silvia Olmastroni	University of Sienna	Italy
Wayne Trivelpiece	NOAA	USA
Yan Ropert-Coudert	CEBC	France

4. Obtain list of colony locations for all species

A list of colony locations was obtained from the Australian Antarctic Data Centre. Although not a complete list of all locations, this will be good starting point; a complete list for each species still need to be finalised. These will be used in the predictive phase of the modelling to predict species distributions from all known breeding locations for all species.

5. Initial quality control of datasets (pre-filtering and post-filtering data clean-up)

This was the largest job for the database management group. There are two phases; pre-filtering and post-filtering quality control.

Pre-filtering requires visual inspection of all individual tracks to:

1. Determine if there are sufficient locations in a track to warrant its inclusion in the analysis. This is very species specific. For some species which make short foraging trips of one or two days very short tracks might be included, but this is not appropriate for far ranging migratory species such as whales.

2. Establish if the location file needs to be “trimmed”. Tags are sometimes turned on before deployment, resulting in spurious locations which need to be removed. Also, tag performance can deteriorate after some time, with fewer and fewer locations received towards the end of a record. If these become too sparse the resulting time gaps will cause problems for the SSAMM and so these need to be identified and removed. Deciding whether a tag has been

moulted and is tracking seaice, rather than the target species is also necessary for some tracks.

3. Establish if the track is a breeding season or non-breeding season track.

4. Location files that span more than one type of breeding status need to be split to form a file for each status. In some very long albatross deployments that go for multiple years this will result in several new files – one for each season. For example, BBAL 123 might have been tracked for 2 years, covering 2 breeding seasons and two non-breeding seasons. The track would then need to be split into 4 files (breeding season1, non-breeding1, breeding2, non-breeding2) and the initial single meta data record (BBAL 123) changed to 4 records (BBAL 123_BS1, BBAL 123_NB1, BBAL 123_BS2, BBAL 123_NB2).

5. Establish the appropriate track interpolation time step for each species.

After the pre-filter quality control, the tracks are run through the SSAMMs with species appropriate time steps to provide (i) a filtered set of locations, with uncertainly estimates for each location and (ii) movement parameter estimates which will be used to generate tracks for the habitat utilisation modelling (HUM) phase described in detail below. Before the HUM modelling can begin there needs to be a final visual inspection of each filtered track to ensure proper movement model fit and convergence. These final checks are to be made by the species coordinators after IJ has run the movement models. He has supplied the coordinators with working versions of code to produce pre-filter maps of all the tracks and to run the movement models.

This work was well advanced by the end of the meeting, but not completed. LH, RR and MH undertook to complete the pre-filtering work within two weeks to ensure the work of the modelling group could continue as soon as possible. **Action Item 3.**

6. Prepare manuscript for a data paper

It was decided that the data paper would be written after the workshop but that it would not be submitted as a stand-alone paper. We will rather make it a companion paper to the first main analysis paper. MH, YR-C and AVdP will write to all data owners to make sure they agree with their data being used for this paper, as it requires that all data are stored in a publicly accessible database. **Action Item 4.**

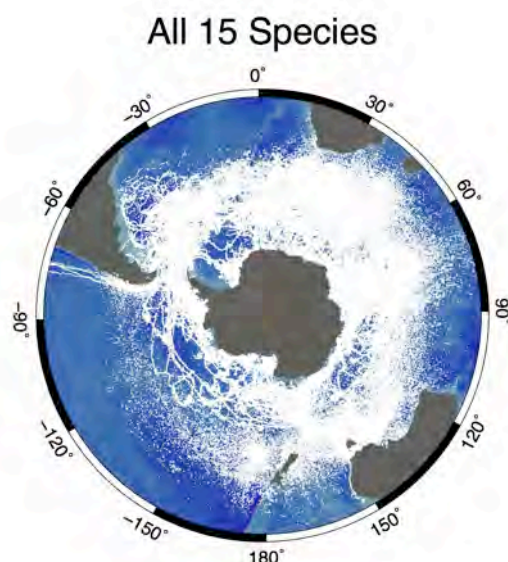
AVdP agreed to be charge of drafting the data paper with YR-C, LH and MH. Co-authorship of RAATD papers was discussed and it was proposed that all the Principal Investigators (data owners) of datasets will be primary authors and will be asked to suggest (and justify) others who might be co-authors. Further discussion of the first analytical paper is reported below.

(ii) Data modelling group

1. Run Movement models for each species.

IJ has made a number of very significant changes and improvements to his State Space Animal Movement Model (SSAMM). Significantly, it now runs much faster and can process all the RAATD locations in about a day. He has also now made it interface directly with files and metafiles in the RAATD format. He described the changes in detail as well as giving all of the data coordinators a tutorial on how to run the pre-filter visualisation step and the final filtering step. It was agreed that each of the data coordinators would take responsibility for the post-filter check of model fits, but that IJ would do the final set of model runs after feedback from the data coordinators, and after the pre-filter changes have been made. This will be by the end of April to give the species coordinators the data sets they need to begin running statistical models as soon as possible. **Action Item 5.**

Figure 2: Map of all 3386 individual deployments available to RAATD in earl April 2016. Note that these have been through a preliminary filtering process, but the data in this figure have not been through the full quality control process.

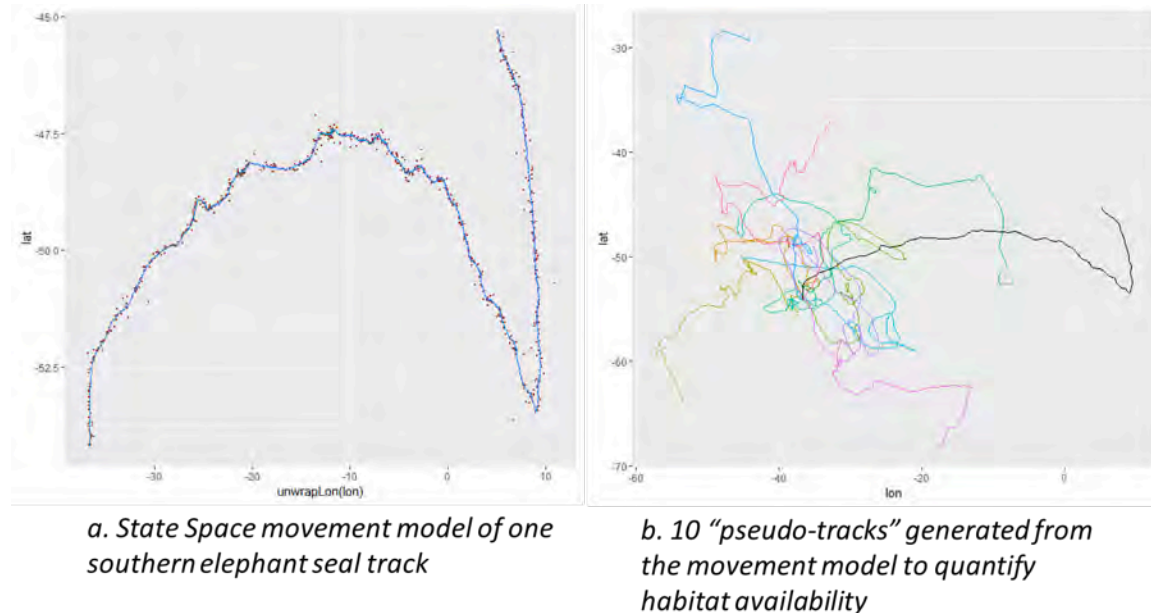


2. Generate Random tracks to define available areas

The strategy for generating realistic random tracks for the selectivity approaches was developed prior to the meeting by BR and SW. Their method takes the movement parameters estimated by the SSAMM and uses them to generate random (or pseudo) tracks which have the same characteristics as the actual track. There are two important features of these random tracks. The first is that they will perform looping tracks that return to the starting place (or other pre-designated haul-out spots) for those species that have colony-based trips. The other is that the tracks do not need to be split into individual trips. They use fixed points with the deployment site, or other resting site, to define the beginning and end of a random track. When a random track gets within a user defined distance of the set points it is deemed to have returned. The R code for doing this was prepared by SW and BR and made available to the

data coordinators in the *Bremerhaven R* package. All coordinators were given instructions for doing running this code for their particular group of species.

Figure 3. Illustration of (a) the SSAMM model where the red dots are original unfiltered data and the blue are the filtered locations on a regular 6 hourly time step, and (b) 10 random (or pseudo) tracks generated by the Bremerhaven package, with the actual track in black.



3. Extract environmental datasets

Code for extracting the environmental data sets was also prepared before the workshop by SW and BR and provided in the *Bremerhaven* package. Climatologies for a large suite of environmental data sets were provided to the workshop from the Australian Antarctic Data Centre. These included a range of satellite products such as SST, SSH, ice concentration, wind strength etc., as well as numerous derived variables, such as distance to ice edge, distance to polynya’s etc. A list of variables is provided in Appendix 2. This will not be the final list of variables used in the analyses, but was intended to enable the data coordinators to start running models and to consider what variables might be most biologically meaningful for their particular species. The intention is to enlarge the available environmental datasets after the data coordinators have thought about what variables are likely to be most relevant.

The gridded selectivity and the usage approaches both require climatologies of environmental data as they inevitably aggregate tracking data over large time periods, and there is no date associated with any particular grid. Further, importance of habitat is in many cases determined by long-term or time-invariant ecological properties (such as average front positions or locations of bathymetric features). Some temporal information may be advantageous to include, such as time of year (summer *vs* winter or breeding *vs* non-breeding) but it was decided that for first model runs we would focus on the coarsest level of temporal aggregation. The individual track selectivity approach retains its time component and so each location can be linked to a specific set of environmental variables collected on the same day as the location.

4. *Develop statistical habitat use models for each species*

This was the biggest and most challenging task for the modelling group. Several steps and decisions were required before preliminary models could be run. We needed to develop R code to produce the response variable data for each of the three approaches (individual track “selectivity”, gridded “selectivity” and gridded “usage”). SW had done this for the gridded “selectivity” approach and included it in the *Bremerhaven* package, and then developed code for the other approaches during the workshop, and then integrated all three approaches into one set of code. He will continue fine-tuning this code and deliver it to the data coordinators as soon as possible. **Action Item 6.**

We also had to decide on the best type of statistical model to use to develop the HUM. The most likely candidates are generalised additive models (GAMs), boosted regression trees (BRT) and boosted GAMs. For the purposes of the workshop we began with GAMs, and preliminary HUMs were derived for each species using the gridded selectivity approach. However, as these were based on datasets that have not been through the quality control steps, or include all the data now available it would not be appropriate to present them in this report. It can be reported that even these preliminary models showed promisingly good fits to the data, at least in terms of % deviance explained, ranging from 30-70%.

The best way to determine what statistical modelling framework to use is to try all three on a range of different species. It was agreed that RR and MH would compare GAMs, BRT and boosted GAMs on a subset of seals, penguins, whales and albatross. They would complete this work within 4 weeks of the end of the workshop **Action Item 7.**

Once the best framework is established the data coordinators can develop models for each species, using their specialist knowledge to ensure the most sensible combination of variables is used. The species were allocated as follows:

LH; Weddell seals, Crabeater seals and Humpback whales

M-AL; Antarctic fur seals & Southern elephant seals

MH; Black-browed, wandering, grey-headed and light-mantle albatross

PT; (with help from MH); Adelie, emperor, king and macaroni (including royal) penguins.

The species-specific models will be developed in conjunction with the modelling team (BR, SW, IJ, Sophie Bestley, RR, and others) and with discussion with data contributors, where appropriate. This model development phase will also identify more biologically-relevant predictor variables for each species, which will be developed (where possible) and added to the available predictors (BR, SB). **Action Item 8**

An important consideration is that we are most interested in using the models for prediction of spatial use rather than interpreting the biological significance of the relationships underpinning the models. While the underlying biology of the HUM models needs to be realistic (and more biologically-relevant models will tend to give better predictions),

describing this is not the initial focus of the RAATD analysis. Rather we need to be confident that spatial predictions that we make for unstudied colonies are the best possible. So once a statistical framework has been decided we will then run a series of cross validations to estimate the uncertainty associated with these predictions. The nature of the cross-validation process has yet to be determined.

5. Generate spatial predictions for each species

Preliminary spatial predictions were run for some species using the GAMs for the gridded selectivity data. Again it would be premature to present these preliminary results here as they were only intended to test the basic code for preparing and using the response variables. One challenge for this step is how to predict for colonies with no tracking data. SW developed code during the workshop to do this in a simple way and has included this into his latest version of the *Bremerhaven* package, so that we can quickly generate these predictions once the final datasets are prepared and the modelling framework decided on. Some questions still remain to be determined out of session, in particular should the size of each colony be included as a weighting factor for the predictions. If so, larger colonies would be more influential than smaller colonies. The alternative approach is to simply identify important species specific habitats for each irrespective of its size.

6. Combine predictions to identify Areas of Ecological Significance

This final step was discussed among the modelling group, but no final decisions made on how best to do it. Further development of possible approaches was allocated to SW, BR, IJ and MH to work on out of session.

The workshop concluded with discussion on (i) the first set of RAATD outputs (ii) future work and responsibilities and (iii) the need for a third RAATD workshop.

Regarding RAATD outputs, it was decided that there would be two initial papers, one detailing the Areas of Ecological Significance in the Southern Ocean and relating these to the intensity of human activity in those areas (perhaps based on the recent Halpern et al. (2015) global analysis of human maritime activity) and also the hotspots of Southern Ocean climate change in terms of changes in ice and SST. This would be submitted to a high impact journal and at the same time the data paper would be submitted as a companion piece. It was recognised that an overview paper would not be able to contain all of the detail regarding analytical approaches, and that there would need to be several methodological papers and possibly an R package to be developed. It was agreed that the first two papers would be submitted later this year with MH and others leading the writing of the analysis paper and AVdP leading the data paper.

In terms of future work, most of the identified tasks have been highlighted as action items throughout this report.

There was unanimous agreement that a RAATD III (and possibly more) workshop is required to continue to progress the data analysis and production of outputs. Shortly after the workshop we were notified of the successful application for a CESAB grant (from the French Foundation for the Research on Biodiversity) by YR-C, MH and others that will provide support for ongoing RAATD work. As this was successful, all the data providers will need to be contacted to ask for inclusion of their data in this on-going work. **Action Item 9**

Conclusion

The RAATD II workshop was a great success and achieved almost all of its stated aims. At the conclusion of the workshop we have:

- Consolidated the available datasets into a collection of over 3000 individual deployments and over 2 million locations from more than 30 international data providers.
- Finalised the metadata associated with these data, locating and fixing numerous errors.
- Established and initiated a process for data quality control.
- Have working R code for running SSAMM.
- Have working R code for calculating 3 different response variables for our HUMs and tested it on a subset of preliminary data.
- Have a mechanism for establishing the best statistical modelling framework for the SMDs.
- Have a process to implement the best statistical modelling framework to provide the species specific HUMs
- Have preliminary R code for making spatial prediction across the entire Southern Ocean based on the HUMs and the location of all colonies.
- Have allocated tasks to members of the group to ensure timely progression of the RAATD objectives

Acknowledgements:

The RAATD team would like to thank the Hanse-Wissenschaftskolleg for its considerable financial and logistic support, and also for providing the first rate meeting facilities. In particular Doris Meyerdierks for her on-the-ground help and kindness. Additional financial support was provided by SCAR Life Science group, the Alfred Wegner Institute, the Deutsche Forschungsgemeinschaft, and Macquarie University. Horst Bornemann was the local organiser and his efforts were largely responsible for the success of the workshop.

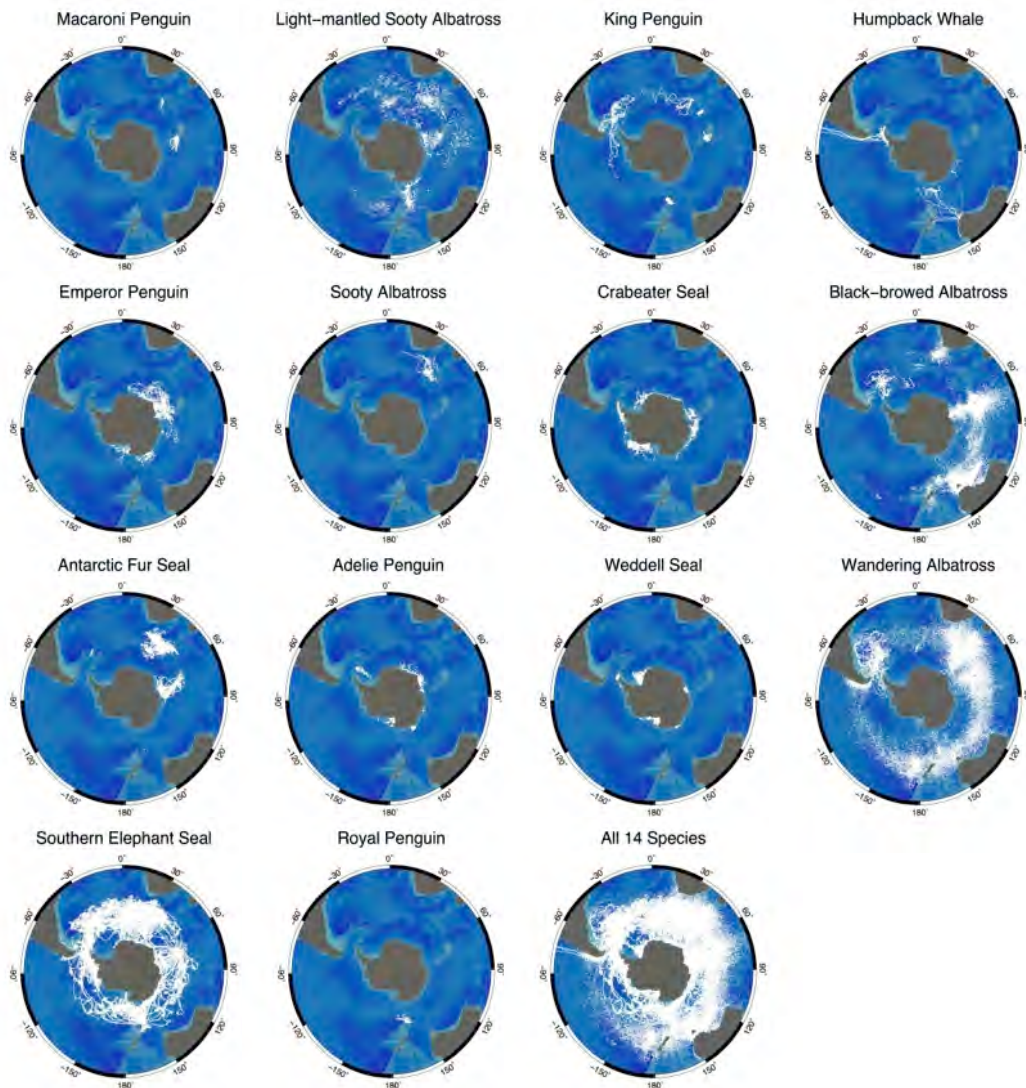


Appendix One: List of environmental covariates available for use in the workshop (provided by B. Raymond, AADC).

bathymetry	nox_50_interpolated_summer_climatology	si_200_interpolated_summer_climatology
bathymetry_slope	nox_50_interpolated_winter_climatology	si_200_interpolated_winter_climatology
benthic_regionalisation	nox_50_summer_climatology	si_200_summer_climatology
caisom_floor_current_speed	nox_50_winter_climatology	si_200_winter_climatology
caisom_floor_salinity	oxygen_0_interpolated_summer_climatology	si_500_interpolated_summer_climatology
caisom_floor_temperature	oxygen_0_interpolated_winter_climatology	si_500_interpolated_winter_climatology
caisom_floor_vertical_velocity	oxygen_0_summer_climatology	si_500_summer_climatology
caisom_surface_current_speed	oxygen_0_winter_climatology	si_500_winter_climatology
chl_summer_climatology	oxygen_200_interpolated_summer_climatology	si_50_interpolated_summer_climatology
distance_antarctica	oxygen_200_interpolated_winter_climatology	si_50_interpolated_winter_climatology
distance_colony	oxygen_200_summer_climatology	si_50_summer_climatology
distance_max_ice_edge	oxygen_200_winter_climatology	si_50_winter_climatology
distance_shelf	oxygen_500_interpolated_summer_climatology	ssh
distance_subantarctic_islands	oxygen_500_interpolated_winter_climatology	ssha_variability
distance_to_canyon	oxygen_500_summer_climatology	ssh_spatial_gradient
distance_to_fast_ice	oxygen_500_winter_climatology	sst_spatial_gradient
distance_to_polynya	oxygen_50_interpolated_summer_climatology	sst_summer_climatology
distance_upper_slope	oxygen_50_interpolated_winter_climatology	surface_meridional_wind_annual
fast_ice	oxygen_50_summer_climatology	surface_meridional_wind_summer
floor_nitrate_cars2009a_mean	oxygen_50_winter_climatology	surface_meridional_wind_winter
floor_oxygen_cars2009a_mean	pelagic_regionalisation	surface_wind_annual
floor_phosphate_cars2009a_mean	salinity_0_interpolated_summer_climatology	surface_zonal_wind_annual
floor_salinity_cars2009a_mean	salinity_0_interpolated_winter_climatology	surface_zonal_wind_summer
floor_silicate_cars2009a_mean	salinity_0_summer_climatology	surface_zonal_wind_winter
floor_temperature	salinity_0_winter_climatology	t_0_interpolated_summer_climatology
floor_temperature_cars2009a_mean	salinity_200_interpolated_summer_climatology	t_0_interpolated_winter_climatology
floor_temperature_interpolated	salinity_200_interpolated_winter_climatology	t_0_summer_climatology
geomorphology	salinity_200_summer_climatology	t_0_winter_climatology
light_budget	salinity_200_winter_climatology	t_200_interpolated_summer_climatology
mixed_layer_depth_summer_climatology	salinity_500_interpolated_summer_climatology	t_200_interpolated_winter_climatology
mixed_layer_depth_summer_climatology_interpolated	salinity_500_interpolated_winter_climatology	t_200_summer_climatology
nox_0_interpolated_summer_climatology	salinity_500_summer_climatology	t_200_winter_climatology
nox_0_interpolated_winter_climatology	salinity_500_winter_climatology	t_500_interpolated_summer_climatology
nox_0_summer_climatology	salinity_50_interpolated_summer_climatology	t_500_interpolated_winter_climatology
nox_0_winter_climatology	salinity_50_interpolated_winter_climatology	t_500_summer_climatology
nox_200_interpolated_summer_climatology	salinity_50_summer_climatology	t_500_winter_climatology
nox_200_interpolated_winter_climatology	salinity_50_winter_climatology	t_50_interpolated_summer_climatology
nox_200_summer_climatology	seaice_gt85	t_50_interpolated_winter_climatology
nox_200_winter_climatology	seaice_summer_variability	t_50_summer_climatology

nox_500_interpolated_summer_climatology	si_0_interpolated_summer_climatology	t_50_winter_climatology
nox_500_interpolated_winter_climatology	si_0_interpolated_winter_climatology	vertical_velocity_250
nox_500_summer_climatology	si_0_summer_climatology	vertical_velocity_500
nox_500_winter_climatology	si_0_winter_climatology	

Appendix Two. Maps for each species of all data available to RAATD in early April 2016.



AGENDA

Monday April 4, 09:00-10:30. Welcome: M. Hindell Recap of the first workshop: M. Hindell Update on modelling work since the first workshop: I. Jonsen, S. Wotherspoon Update on database collation and management since first workshop: Y. Ropert-Coudert Discussion on structure and anticipated outputs from the second workshop: M. Hindell	10:30 Coffee
Monday, April 4, 10:45-12:45. Break into two working groups: (i) Database Management group – tasks for this group <ul style="list-style-type: none"> • Compile metadata records • Identify and source missing datasets • Initial quality control of data sets. See (http://web.science.mq.edu.au/~ijonsen/raatd/) for Ian's first cut at filtering • Prepare manuscript for a data paper (ii) Data modelling group – tasks for this group <ul style="list-style-type: none"> • Run movement models for each species • Generate random tracks to define available areas • Extract environmental data sets • Develop statistical habitat use models for each species • Generate spatial predictions for each species • Combine predictions to identify Areas of Ecological significance 	12:45 Lunch
Monday, April 4, 13:30-17:30. Working groups continue	15:30 Coffee 18:00 Buffett
Tuesday, April 5, 9:00-10:00. Update on progress of working groups	10:00 Coffee
Tuesday, April 5, 10:30-17:30. Working groups continue	12:30 Lunch 15:30 Coffee 18:00 Dinner
Wednesday, April 6, 9:00-10:30. Update on progress of working groups Discussion on publishing strategy – how many papers and what journals	10:30 Coffee
Wednesday, April 6, 11:00-12:30. Working groups continue	12:30 Lunch
Wednesday, April 6, 13:30-17:30. Working groups continue	15:30 Coffee 19:00 Dinner
Thursday April 7, 09:00-12:30. Update on progress of working groups Working groups continue	10:30 Coffee 12:30 Lunch
Thursday, April 7, 13:30-17:30. Working groups continue	15:30 Coffee 18:00 Dinner
Friday April 8, 09:00-12:00. Update on progress of working groups Discussion on outputs and future work Work on workshop report Workshop closing comments	10:30 Coffee 12:00 Lunch



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EG-Continuous Plankton Recorder and the SCAR Southern Ocean CPR Survey (SO-CPR)

Contacts: Kunio T. Takahashi, takahashi.kunio@nipr.ac.jp
Graham W. Hosie, graham.hosie@iinet.net.au

1-2 paragraph summary of activities from 2014-2016

Since the last report 2014, we have completed about 150 CPR tows during the 2014/15 and 2015/16 Antarctic field season from seven vessels from Australia, Japan, New Zealand, South Africa and France. Approximately 250,000 nautical miles have been sampled since the commencement of the SO-CPR Survey in 1991, representing some 50,000 samples for nearly 250 zooplankton taxa coupled with environmental data.

The methodology and taxonomy training workshop was conducted in March 2015 at the Cape Town for South African CPR personnel, via support from an inaugural the Scientific Committee on Antarctic Research (SCAR) Visiting Professorship awarded to Dr Graham Hosie and the support of the Department of Environmental Affairs (DEA) South Africa.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

The EG-CPR transitions to the SO-CPR Database (Task) Group focused on maintaining the quality control and assurance of data entered into the SCAR Southern Ocean CPR Database, achieved primarily through conducting standardisation and training workshops.

Date/Year Group Approved: 2008

Date/Year Group is to End: 2016

Expert Groups normally have a life span of six to eight years. EG-CPR is nominally due to end in 2016. However, there is still much to do in relation to developing/maintaining the SO-CPR Database, improving access for users, as well as encouraging involvement by other nations to fill spatial and temporal gaps.

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

No. We've displayed a poster of the SO-CPR Database as a SCAR Business Product at previous SCAR meetings, e.g. St Petersburg, Buenos Aires, Portland. It may still be on file. We are not planning to produce a new poster.



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Further Details:

Major Activities and Significant Progress from past 2 years

Since the last report 2014, we have completed about 150 tows during the 2014/15 and 2015/16 Antarctic field season from seven vessels. Thirty-three tows were completed from RSV *Aurora Australis* (Australia) in the region south and south-west of Australia primarily in the period from spring (October) to autumn (March). The JMSDF *Shirase* and TV *Umitaka-maru* (Japan) completed 12 and 13 tows respectively in the same region. The FV *San Aotea II* (New Zealand) and RV *Tangaroa* (New Zealand) completed about 30 tows in the region between New Zealand and the Ross Sea. The new South African research and ice-breaker *SA Agulhas II* about 20 tows south of Africa. The RV *Marion Dufresne II* (France) conducted 45 tows in the sub-Antarctic region between the Kerguelen, Amsterdam and Crozet Islands. Most of these were tows shorter than the standard 450 nautical miles. The *Aurora Australis* primarily operated between spring (October) to autumn (March). The other vessels operated more during the summer period of December to February/March, although the *Agulhas II* has conducted tows to the Sea-Ice Zone in winter. There are too few winter tows in the Antarctic. Currently, New Zealand is conducting winter tows in the region between New Zealand and the Ross Sea. Approximately 250,000 nautical miles have been sampled since the commencement of the SO-CPR Survey in 1991, representing some 50,000 samples for nearly 250 zooplankton taxa coupled with environmental data.

The SO-CPR Survey involves numerous countries with analyses conducted by experienced and well recognized plankton and Antarctic researchers albeit in several separated laboratories. Consequently, we take every opportunity when we meet to run workshops on methods and taxonomy to ensure we are maintaining the highest level of procedures and identification standards for quality control and assurance. We also regularly exchange information and images electronic. The latest methodology and taxonomy training workshop was conducted in March 2015 at the Cape Town for South African CPR personnel, via support from an inaugural the Scientific Committee on Antarctic Research (SCAR) Visiting Professorship awarded to Dr Graham Hosie and the support of the Departmental of Environmental Affairs (DEA) South Africa.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

Expert Groups normally have a life span of six to eight years. EG-CPR is nominally due to end in 2016. During its term it has successfully addressed its Terms of Reference. For example, the Southern Ocean CPR Survey has



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expanded considerably to now include participation by Australia, Japan, New Zealand, France, South Africa, Brazil, Chile, UK, France, Germany, and Russia, providing a near circumpolar coverage from 17 regular and opportunistic vessels. There are still regions in the Pacific sector and Weddell Sea that are not monitored. The dataset forms an important part of SCAR-MarBIN (biodiversity.aq), is widely used by various agencies, researchers, and graduate studies, and was an important dataset used in the production of the SCAR Biogeographic Atlas of the Southern Ocean. A substantial number of other papers, theses and governmental reports have been produced.

However, there is still much to do in addressing the terms of references relating to developing and maintaining the SO-CPR Database, improving access for users, and through training workshops continue to expand and enhance the SO-CPR Survey to include more ships and repeat transects around Antarctica.

We are at various stages in bringing in and assisting other nations, such as China, Korea, India. We have provided training to Korea. We are still developing a training programme for India to help them establish their Southern Ocean CPR work. Dr Kunio Takahashi has already been awarded a Scientific Committee on Oceanic Research (SCOR) Visiting Scholars Program 2015 to help teach the Southern Ocean taxonomy and methods. The timing of the Indian workshop is under negotiation has the support of the Scientific Committee on Antarctic Research (SCAR), the Scientific Committee on Oceanic Research (SCOR), and the Partnership for Observation of the Global Oceans (POGO).

The SO-CPR dataset is an important SCAR Business Product and it is dependent on regular taxonomy and methodology standardisation workshops to maintain and ensure the quality assurance and quality control of the data. Consequently, we plan to continue the CPR group and to transition it to a "SO-CPR Database (Task) Group" for the purpose of maintaining database use and standards and specifically conducting workshops every two years. Countries interested in joining SO-CPR will be encouraged to participate in those workshops, and we are prepared to hold additional workshops if necessary and subsequent to funding. The new group is expected to be long term, subject to biennial review that the SO-CPR Database continues to grow, is used and is valued. See Appendix 1 for the revised Terms of Reference and membership.



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Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2017	Standardisation- Training workshop	3500	Kunio Takahashi	takahashi.kunio@nipr.ac.jp
2018	Standardisation- Training workshop	3500	Kunio Takahashi	takahashi.kunio@nipr.ac.jp

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes): Each national partner in the SO-CPR Survey financially support their own tows, logistics, analysis and contributions to the database. The SCAR funding provides the opportunity to bring the various groups together to ensure that their taxonomic analysis, sampling methodology, quantitative analysis methodology and data quality remains at the highest common standard. The SCAR funding does not cover all costs of the workshops, but does provide very useful seed money to leverage additional support. It is difficult to define the precisely the percentage of future funds that will be directed to early career scientist, or scientists with developing Antarctic programmes. A significant amount of funds have assisted such scientists previously, including those in Brazil, Chile and other South American countries, as well as South Africa and Korea. As noted above, we are developing a programme for India.

External Linkages – Support and Coordination beyond SCAR:

The SO-CPR Survey is a founding member of the Global Alliance of CPR Surveys (GACS). Following the celebrations in Plymouth UK in September 2011 marking the 80th anniversary of the start of the North Sea CPR tows, the heads of the nine regional CPR surveys at that time met to discuss the formation of a global CPR programme. A global CPR coverage has long been a vision of SAHFOS and the then Director Prof. Peter Burkill was successful in obtaining funds to get the initiative started. “Going Global” was a vision shared by the regional surveys as well, and we enthusiastically agreed to form GACS. The general goal of GACS is to understand changes in plankton biodiversity at ocean basin scales through a global alliance of CPR surveys. By “understand” we mean characterise, analyse and interpret. GACS has a number of specific initial aims which include:

- development of a global CPR database



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- production of a regular Ecological Status Report for global plankton biodiversity
- ensuring common standards and methodologies are maintained
- providing an interface for plankton biodiversity with other global ocean observation programmes
- to set up and maintain a website for publicity and data access
- to facilitate new surveys and develop capacity building procedures
- to facilitate secondments of CPR scientists between GACS institutions

A Board of Governance was established, comprising the regional heads of CPR Surveys. Dr Graham Hosie took on the task of being the first Chair of the Board with Dr Sonia Batten (North Pacific CPR) as Vice-Chair. GACS has brought together the expertise of approximately 50 plankton specialists, scientists, technicians and administrators from 12 laboratories around the world, towing CPRs from about 50 vessels. Working together, pooling our data and resources, was considered essential in order to understand the effects of environmental changes on plankton biodiversity at a global level. From a SO-CPR perspective, we can place our Southern Ocean regional observations in a global context. We can also draw on a lot of expertise from our CPR colleagues from around the world. GACS is assisted by two working groups that have addressed the formation of the global CPR database, and also maintaining standards and methodologies. SO-CPR has contributed to three Global Status reports published by GACS. GACS also has representation on the Biology and Ecosystem Panel of the Global Ocean Observing System (GOOS). Drs Takahashi and Hosie are continuing to work on a Southern Ocean specific Status Report on Southern Ocean zooplankton, which is expected to be complete in the next year.

The database is hosted by the Australian Antarctic Data Centre. The data are shared with GACS, transmitted to SCAR's biodiversity.aq, transmitted to other data portals such as Ocean Biogeographic Information System (OBIS) and Atlas of Living Australia, and the data are offered to CCAMLR.

Please describe your outreach, communication and capacity building activities:

Over the last decade, EG-CPR has conducted numerous training workshops in Australia, Japan, New Zealand, UK, and Brazil. In the last two years, as noted above a taxonomy and methodology training workshop was conducted in Cape Town supported by a SCAR Visiting Professorship awarded to Dr Graham Hosie and by the Department of Environmental Affairs (DEA) South Africa. Approximately 15 people representing marine research technicians, research assistants, and researchers participated. A training workshop is planned for India. A standardisation workshop for the current team of SO-



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CPR analysts is planned for later this year. Small training sessions have been conducted for those participating in Australia's and Japan's Antarctic programme. Dr Hosie has assisted graduate students and post-doctoral fellows in Australia in the use and analysis of the dataset.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

See Appendix 2 for the list of all papers published since 2006 supported by the Action Group and later the Expert Group on CPR Research, or using data from the SO-CPR Database.

Below are papers published in the last two years.

Constable, A.J., Melbourne-Thomas, J., Corney, S.P., Arrigo, K.R., Barbraud, C., Barnes, D.K.A., Bindoff, N.L., Boyd, P.W., Brandt, A., Costa, D.P., Davidson, A.T., Ducklow, H.W., Emmerson, L., Fukuchi, M., Gutt, J., Hindell, M.A., Hofmann, E.E., Hosie, G.W., Iida, T., Jacob, S., Johnston, N.M., Kawaguchi, S., Kokubun, N., Koubbi, P., Lea, M-A., Makhado, A., Massom, R.A., Meiners, K., Meredith, M.P., Murphy, E.J., Nicol, S., Reid, K., Richerson, K., Riddle, M.J., Rintoul, S.R., Smith Jr., W.O., Southwell, C., Stark, J.S., Sumner, M., Swadling, K.M., Takahashi, K.T., Trathan, P.N., Welsford, D.C., Weimerskirch, H., Westwood, K.J., Wienecke, B.C., Wolf-Gladrow, D., Wright, S.W., Xavier, J.C., Ziegler, P. (2014) Climate change and Southern Ocean ecosystems I: How changes in physical habitats directly affect marine biota. *Global Change Biology*, 20: 3004-3025, DOI: 10.1111/gcb.12623

Cuzin-Roudy, J., Irisson, J-O., Penot, F., Kawaguchi, S., Vallet, C. (2014) Southern Ocean euphausiids. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) *The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean*. Scientific Committee on Antarctic Research, Cambridge, UK, pp 309-320

De Broyer, C., Koubbi, P., Griffiths, H., Raymond, B., d'Udekem d'Acoz, C., Van de Putte, A., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Roper-Coudert, Y., (eds) (2014) *The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean*. Scientific Committee on Antarctic Research, Cambridge, UK.

Edwards, M., Helaouet, P., Alhaija, R. A., Batten, S., Beaugrand, G., Chiba, S., Horaeb, R. R., Hosie, G., Mcquatters-Gollop, A., Ostle, C., Richardson, A.



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J., Rochester, W., Skinner, J., Stern, R., Takahashi, K., Taylor, C., Verheye, H. M., Wootton, M. (2016). Global Marine Ecological Status Report: results from the global CPR survey 2014/2015. *SAHFOS Technical Report*, 11, 1-32. Plymouth, U.K. ISSN 1744-0750.

Edwards, M., Helaouet, P., Johns, D.G., Batten, S., Beaugrand, G., Chiba, S., Hall, J., M., Head, E., Hosie, G., Kitchener, J., Koubbi, P., Kreiner, A., Melrose, C., Pinkerton, M., Richardson, A.J., Robinson, K., Takahashi, K., Verheye, H.M., Ward, P. & Wootton, M. (2014) Global Marine Ecological Status Report: results from the global CPR survey 2012/2013. *SAHFOS Technical Report*, 10: 1-37. Plymouth, U.K. ISSN 1744-0750

Griffiths, H.J., Van de Putte, A., Danis, B. (2014) Data distribution: patterns and implications. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) *The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean*. Scientific Committee on Antarctic Research, Cambridge, UK, pp 16-26

Gutt, J., Bertler, N., Bracegirdle, T.J., Buschmann, A., Comiso, J., Hosie, G., Isla, E., Schloss, I.R., Smith, C.R., Tournadre, J., Xavier, J.C. (2014) The Southern Ocean ecosystem under multiple climate change stresses - an integrated circumpolar assessment. *Global Change Biology*, 21 (4), 1434-1453, DOI: 10.1111/gcb.12794

Hosie, G., Mormède, S., Kitchener, J., Takahashi, K., Raymond, B (2014) Chapter 10.3. Near-surface zooplankton community. In: De Broyer C., Koubbi P., Griffiths H.J., Raymond B., Udekem d'Acoz C. d', Van de Putte A.P., Danis B., David B., Grant S., Gutt J., Held C., Hosie G., Huetmann F., Post A., Roper-Coudert Y. (eds.), *Biogeographic Atlas of the Southern Ocean*. Scientific Committee on Antarctic Research, Cambridge, pp. 422-430.

Koubbi, P., De Broyer, C., Griffiths, H., Raymond, B., d'Udekem d'Acoz, C., Van de Putte, A., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Roper-Coudert, Y., Stoddart, M.1, Swadling, K., Wadley, V. (2014) **CONCLUSION: Present and Future of Southern Ocean Biogeography**. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) *The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean*. Scientific Committee on Antarctic Research, Cambridge, UK, pp 470-475



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Kouwenberg, J.H.M., Razouls, C., Desreumaux, N., (2014) Southern Ocean pelagic copepods. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, UK, pp 290-296

Meilland, J., Favri-Ruiz, S., Koubbi, P., Lo Monaco, C., Cotte, C., Hosie, G. W., Sanchez, S., Howa, H. (2016). Planktonic foraminiferal biogeography in the Indian sector of the Southern Ocean: Contribution from CPR data. *Deep-Sea Research I*, 110, 75-89. doi:10.1016/j.dsr.2015.12.014

Roberts, D., Hopcroft, R.R., Hosie, G.W. (2014) Southern Ocean Pteropods. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, UK, pp 276-283

Robinson, K.V., Pinkerton, M.H., Hall, J.A., Hosie, G.W., (2014) Continuous Plankton Recorder Time Series. New Zealand Aquatic Environment and Biodiversity Report No. 128. Ministry for Primary Industries, Wellington. 74 pp. ISBN 978-0-478-43226-8

Takahashi, K. T., Hosie, G. W., Odate, T. (2016). Intra-annual seasonal variability of surface zooplankton distribution patterns along a 110°E transect of the Southern Ocean in the austral summer of 2011/12. *Polar Science*, doi:10.1016/j.polar.2016.06.09

Takahashi, K. T., Iida, T., Ojima, M., Odate, T. (2015). Zooplankton sampling during the 55th Japanese Antarctic Research Expedition in austral summer 2013-2014. *JARE Data Report*, 336 (Marine Biology 49), 15p.

Zeidler, W., De Broyer, C. (2014) Amphipoda Hyperidea. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, UK, pp 303-308

As part of SCAR's Capacity Building efforts, such as the Fellowships and Visiting Professor Awards, we are looking for people from all the SCAR



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groups to act form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications.

Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

Actually, the main web page for the SCAR SO-CPR Survey is hosted by the Australian Antarctic Data Centre, along with the database. The web page is currently being updated by the AADC. The transitioning of the EG-CPR to the new CPR Database Group provides the opportunity to revise the current SCAR CPR page with the new ToR and membership.

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Kunio	Takahashi	National Institute of Polar Research	Japan	Takahashi.kunio@nipr.ac.jp	2012	
Graham	Hosie	SCAR	Australia	graham.hosie@inet.net.au	2008	2016



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Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.

Dr Kunio Takahashi: Kunio is the Assistant Professor of National Institute of Polar Research Japan. He participated in 10 Antarctic expeditions on Australian, New Zealand and Japanese ships. He has been leading the Japanese CPR work since 1999, and also been an active publisher of CPR papers and served as Deputy-Director of SO-CPR during 2013. He has become the Director of SO-CPR and Chief Officer of EG-CPR since 2014.

Dr Graham Hosie: Graham was the Principal Research Scientist in zooplankton research at the Australian Antarctic Division. He retired from the AAD in December 2013 after more than 30 years studying krill and zooplankton ecology. He participated in 17 Antarctic expeditions on Danish, German, Australian and Japanese ships, many as chief biologist, chief scientist or expedition leader. He established the SCAR Southern Ocean Continuous Plankton Recorder (SO-CPR) Survey in 1991, a plankton monitoring programme involving about 12 nations and 17 vessels, and was Director of SO-CPR and Chair of EG-CPR until 2014 when Dr Kunio Takahashi took over. He was also the inaugural Chair of the Board of Governance of the Global Alliance of CPR Surveys (GACS) (2011-2014), member of the Council and later the Science Advisory Board of the Sir Alister Hardy Foundation for Ocean Science (SAHFOS). He was awarded the first Emeritus Life Fellowship of SAHFOS in 2015 as well as one of the inaugural SCAR Visiting Professorships in 2013. He continues to act as a CPR Ambassador for GACS and SO-CPR actively promoting CPR research, training and advising existing and new surveys. He is currently Chief Officer of the SCAR SSG-Life Sciences.

Other members

First Name	Last Name	Affiliation	County	Email
Hans	Verheye	South African Departmental of Environmental Affairs	South Africa	Hans.verheye@gmail.com



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Julie	Hall	NZ National Institute of Water and Atmospheric Research	New Zealand	Julie.hall@niwa.co.nz
Philippe	Koubbi	Université Pierre and Marie Curie	France	Philippe.koubbi@upmc.fr
Andrew	Davidson	Australian Antarctic Division	Australia	Andrew.Davidson@aad.gov.au
John	Kitchener	AAD	Australia	John.kitchener@aad.gov.au
Karen	Robinson	NIWA	New Zealand	Karen.robinson@niwa.co.nz
Erik	Muxagata	University of Rio Grande	Brazil	e.muxagata@gmail.com



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Appendix 1 Transition of the “Expert Groups on CPR Research” to a task group “CPR Database Group”

Current Status

The EG-CPR was established to assist the development and expansion of the CPR research in the Southern Ocean and Antarctic waters. The original terms of reference of the EG-CPR are:

1. Map the biodiversity and distribution of plankton, including euphausiid (krill) life stages, in the Southern Ocean.
2. Use the sensitivity of plankton to environmental change as early warning indicators of the health of Southern Ocean, by studying spatial-temporal variation in plankton patterns.
3. Serve as reference on the general status of the Southern Ocean for other monitoring programs.
4. Develop and maintain the SO-CPR Database and to improve access for users.
5. Expand and enhance the SO-CPR Survey to include more ships and repeat transects around Antarctica.

The EG-CPR has proved invaluable in helping the Southern Ocean CPR Survey becoming a high successful biological survey and monitoring programme with a near circum-Antarctic coverage. In turn it has become an important source of data and information for other SCAR initiatives such as SCAR-MarBIN, the Census of Antarctic Marine Life (CAML) and the Southern Ocean Observing System (SOOS). In turn, SO-CPR and EG-CPR were important foundation members of the Global Alliance of CPR Surveys (GACS) which places the Antarctic CPR data in a global context. During the term of the EG-CPR and its predecessor Action Group some 40 papers have been published in relation to ToR 1, 2 and 3, including the SCAR Biogeographic Atlas of the Southern Ocean. That work still continues, but in recent years the main focus of EG-CPR has been on ToR 4 and 5, particularly in improving access/use of the CPR data, an important SCAR Business Product, and ensuring quality assurance and quality control of that data through training and standardisation workshop. That work needs to continue for the foreseeable future to ensure we are collecting and distributing the best quality plankton data.

New Group and Terms of Reference

We propose that the EG-CPR transitions to a task group, the CPR Database Group, to focus on the QA/QC of the data and maintaining the highest methodological standards in CPR sampling and taxonomic methodology across the SO-CPR Survey laboratories. The proposed new Terms of Reference are:



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1. Continue to develop and maintain the SO-CPR Database and to improve access for users.
2. To ensure QA/QC of the data through regular training and standardisation workshops.
3. Encourage other nations, especially developing Antarctic nations, to participate in the workshops and subsequently improve spatial and temporal coverage of CPR tows around Antarctica.

Membership

The CPR Database Group will become more of technical comprising the national CPR managers, sample analysts and data collators. The core group will comprise the following members, but new members will be added representative of new nations in the SO-CPR:

Dr Kunio Takahashi, NIPR (Japan), SO-CPR Director - Chair
Mr John Kitchener, AAD (Australia), Chief Analyst AAD – Deputy Chair
Ms Karen Robinson, NIWA (New Zealand), Analyst NIWA
Ms Marianne Wootton, SAHFOS (UK), Senior Analyst SAHFOS
Dr Sir Hans Verheye, DEA (South Africa)
Prof. Philippe Koubbi, UPMC (France)
Prof. Erik Muxagata, URG (Brazil)
Dr Ben Raymond, AAD (Australia), AADC Data Manager
Dr Graham Hosie, ex officio, Advisor and CPR Ambassador

Duration

The new group will not have set life span initially. The group is expected to be long term. Its continuance will be subject to review at the biennial SCAR Business Meeting and providing the SO-CPR Database continues to grow, that the data continues to be used and that the database and CPR survey is seen as being valuable to the Antarctic community.

Budget

The budget is likely to be around \$3500 per annum, and \$3500 is requested initially for each of 2017 and 2018. The SCAR funding does not normally cover all costs of the workshops, but does provide very useful seed money to leverage additional support participants' home institutes. Funds are usually prioritised to those with limited travel funds, e.g. early career scientists or those from developing nations.



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Appendix 2 Publications

Papers published since 2006 supported by the Action Group (2006-2008) and later the Expert Group on CPR Research (2008 to present), or using data from the SO-CPR Database.

Atkinson, A., Ward, P., Hunt, B.P.V., Pakhomov, E.A., and Hosie G.W. (2012) An overview of Southern Ocean zooplankton data: abundance, biomass, feeding and functional relationships. CCAMLR Science 19, 48 pp

Constable, A.J., Melbourne-Thomas, J., Corney, S.P., Arrigo, K.R., Barbraud, C., Barnes, D.K.A., Bindoff, N.L., Boyd, P.W., Brandt, A., Costa, D.P., Davidson, A.T., Ducklow, H.W., Emmerson, L., Fukuchi, M., Gutt, J., Hindell, M.A., Hofmann, E.E., Hosie, G.W., Iida, T., Jacob, S., Johnston, N.M., Kawaguchi, S., Kokubun, N., Koubbi, P., Lea, M-A., Makhado, A., Massom, R.A., Meiners, K., Meredith, M.P., Murphy, E.J., Nicol, S., Reid, K., Richerson, K., Riddle, M.J., Rintoul, S.R., Smith Jr., W.O., Southwell, C., Stark, J.S., Sumner, M., Swadling, K.M., Takahashi, K.T., Trathan, P.N., Welsford, D.C., Weimerskirch, H., Westwood, K.J., Wienecke, B.C., Wolf-Gladrow, D., Wright, S.W., Xavier, J.C., Ziegler, P. (2014) Climate change and Southern Ocean ecosystems I: How changes in physical habitats directly affect marine biota. Global Change Biology, 20: 3004-3025, DOI: 10.1111/gcb.12623

Cuzin-Roudy, J., Irisson, J-O., Penot, F., Kawaguchi, S., Vallet, C. (2014) Southern Ocean euphausiids. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, UK, pp 309-320

De Broyer, C., Koubbi, P., Griffiths, H., Raymond, B., d'Udekem d'Acoz, C., Van de Putte, A., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Roper-Coudert, Y., (eds) (2014) The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, UK.

Edwards, M., Helaouet, P., Alhaija, R. A., Batten, S., Beaugrand, G., Chiba, S., Horaeb, R. R., Hosie, G., Mcquatters-Gollop, A., Ostle, C., Richardson, A. J., Rochester, W., Skinner, J., Stern, R., Takahashi, K., Taylor, C., Verheye, H. M., Wootton, M. (2016). Global Marine Ecological Status Report: results from the global CPR survey 2014/2015. *SAHFOS Technical Report*, 11, 1-32. Plymouth, U.K. ISSN 1744-0750.



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Edwards, M., Helaouet, P., Johns, D.G., Batten, S., Beaugrand, G., Chiba, S., Hall, J., M., Head, E., Hosie, G., Kitchener, J., Koubbi, P., Kreiner, A., Melrose, C., Pinkerton, M., Richardson, A.J., Robinson, K., Takahashi, K., Verheye, H.M., Ward, P. & Wootton, M. (2014) Global Marine Ecological Status Report: results from the global CPR survey 2012/2013. SAHFOS Technical Report, 10: 1-37. Plymouth, U.K. ISSN 1744-0750

Edwards, M., Helaouet, P., Johns, D.G., Batten, S., Beaugrand, G., Chiba, S., Flavell, M., Head, E., Hosie, G., Richardson, A.J., Takahashi, K., Verheye, H.M., Ward, P. & Wootton, M. (2012) Global Marine Ecological Status Report: results from the global CPR survey 2010/2011. SAHFOS Technical Report, 9: 1-40. Plymouth, U.K. ISSN 1744-0750

Griffiths, H.J., Van de Putte, A., Danis, B. (2014) Data distribution: patterns and implications. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) The CAML/SCAR-MarBIN Biogeographic Atlas of the Southern Ocean. Scientific Committee on Antarctic Research, Cambridge, UK, pp 16-26

Gutt, J., Bertler, N., Bracegirdle, T.J., Buschmann, A., Comiso, J., Hosie, G., Isla, E., Schloss, I.R., Smith, C.R., Tournadre, J., Xavier, J.C. (2014) The Southern Ocean ecosystem under multiple climate change stresses - an integrated circumpolar assessment. *Global Change Biology*, 21 (4), 1434-1453, DOI: 10.1111/gcb.12794

Gutt, J., Hosie, G., and Stoddart, M. (2010) Chapter 11. Marine Life in the Antarctic. In (A. McIntyre ed) *Life in the World's Oceans: Diversity, Distribution, and Abundance*. Wiley-Blackwell, Chichester. 384pp

Hosie, G., Mormède, S., Kitchener, J., Takahashi, K., Raymond, B (2014) Chapter 10.3. Near-surface zooplankton community. In: De Broyer C., Koubbi P., Griffiths H.J., Raymond B., Udekem d'Acoz C. d', Van de Putte A.P., Danis B., David B., Grant S., Gutt J., Held C., Hosie G., Huetmann F., Post A., Roper-Coudert Y. (eds.), *Biogeographic Atlas of the Southern Ocean*. Scientific Committee on Antarctic Research, Cambridge, pp. 422-430.

Hosie, G.W., Fukuchi, M., Koubbi, P., Moteki, M., Ozouf-Costaz, C., Riddle, M.J., (eds), (2011) CEAMARC - The Collaborative East Antarctic Marine Census for the Census of Antarctic Marine Life. *Polar Science* 5(2), 75-312



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Hosie, G.W., Koubbi, P., Riddle, M., Ozouf-Costaz, C., Moteki, M., Fukuchi, M., Ameziane, N., Ishimaru, T., Goffart, A. (2011) CEAMARC, the Collaborative East Antarctic Marine Census for the Census of Antarctic Marine Life (IPY # 53): an overview. *Polar Science* 5 (2), 75-87

Hosie, G.W., Stoddart, D.M., Wadley, V., Koubbi, P., Ozouf-Costaz, C., Ishimaru, T. and Fukuchi, M. (2007), The Census of Antarctic Marine Life and the Australian-French-Japanese CEAMARC (Collaborative East Antarctic Marine Census) contribution. *Proceedings of the International Symposium Asian Collaboration in IPY 2007 -2008*. Publisher - National Institute of Polar Research, Tokyo. pp 47-50

Hunt, B. P. V., Pakhomov, E. A., Hosie, G. W., Siegel, V., Ward, P. Bernard, K. (2008) Pteropods in Southern Ocean ecosystems. *Progress in Oceanography*, 78, 193-221

Hunt, B.P.V. and Hosie, G.W. (2006) Continuous Plankton Recorder flow rates revisited: clogging, ship speed, and flowmeter design. *Journal of Plankton Research*. 28, 847-855

Hunt, B.P.V. and Hosie, G.W. (2006) Seasonal zooplankton community succession in the Southern Ocean south of Australia, Part I: The Seasonal Ice Zone. *Deep-Sea Research I* 53, 1182-1202

Hunt, B.P.V. and Hosie, G.W. (2006) Seasonal zooplankton community succession in the Southern Ocean south of Australia, Part II: The Sub-Antarctic to Polar Frontal Zones. *Deep-Sea Research I* 53, 1203-1223

Hunt, B.P.V. and Hosie, G.W. (2006) Continuous Plankton Recorder flow rates revisited: clogging, ship speed, and flowmeter design. *Journal of Plankton Research*. 28, 847-855

Hunt, B.P.V. and Hosie, G.W. (2008) Southern Ocean biogeography and taxonomic resolution: what's in the name? *Marine Biology* 155, 191-203

Koubbi, P., De Broyer, C., Griffiths, H., Raymond, B., d'Udekem d'Acoz, C., Van de Putte, A., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Roper-Coudert, Y., Stoddart, M.1, Swadling, K., Wadley, V. (2014) CONCLUSION: Present and Future of Southern Ocean Biogeography. In: De Broyer, C., Koubbi, P., Griffiths, H., Danis, B., David, B., Grant, S., Gutt, J., Held, C., Hosie, G., Huetmann, F., Post, A., Raymond, B., Roper-Coudert, Y., Van de Putte, A., (eds) *The CAML/SCAR-MarBIN*



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SCAR COMNAP Joint Expert Group Human Biology and Medicine

Contacts: (name and email)

Dr Jeff Ayton Chief Officer- jeff.ayton@aad.gov.au

Dr Eberhard Kohlberg Deputy Chief Officer - eberhard.kohlberg@awi.de

Dr Anne Hicks Secretary annehicks1@nhs.net

**Prof Marc Shepanek SCAR SSG Life Sciences Deputy Chief Officer-
marc.a.shepanek@nasa.gov**

Summary of activities from 2014-2016:

- The Chief Officer was nominated and participated in the SCAR Horizon Scan in April 2014 representing the international Human Biology and Medicine Research community after considerable electronic input from SCAR and international medical researchers with resultant published outputs including key questions for future research and cross cutting collaboration.

Question 56 How will climate change affect the risk of spreading emerging infectious diseases in Antarctica?

Question 80 How will humans, diseases and pathogens change, impact and adapt to the extreme Antarctic environment?

- SCAR COMNAP 2014 JEGHBM Business meetings held over 3 days had good attendance with 10 full members (or proxies) and 2 Associate members reestablishing the newly combined JEGHBM.
- SCAR OSC 2014 had full participation including 12 Peer reviewed scientific presentations and 8 Poster presentations with new and early career investigators and full audience attendance at both sessions including interest from social .
- JEGHBM members travelled to Christchurch to present at COMNAP AGM
- East Asian JEGHBM members held annual Asian Human Biology and Medicine meeting in Japan in July 2014
- The JEGHBM has continued to provide critical peer professional and operational support to our international colleagues, in particular where nations have transitioned to new providers or chiefs of medical programs.



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Further international interaction subject to travel approvals particularly for medical officers new to the field is encouraged. In addition, given the unique nature of Antarctic medical practice the JEGHBM has provided confidential professional guidance to international colleagues when faced with contentious and challenging clinical decisions.

- To improve the focus of activity within the group, four historical sub committees were disbanded. Sub-groups will form in the light of future taskings from SCAR, ACTM and COMNAP
- Capacity building awards for Human Biology and Medicine researchers were instituted in 2014 for presentations and posters to encourage wider representation from the greater scientific community.
- The APECS group has also been approached and encouraged to interact with the JEGHBM to facilitate wider participation of the next generation of human biology and medicine researchers. Dr Nathalie Pattyn (Belgium) is the JEGHBM Liaison with APECS.
- The SCAR 2014 Open Science Conference and JEGHBM meetings created networks for operational and scientific exchanges and collaboration. In particular the group has supported the development and solidifying of trusted professional relationships allowing efficient interagency screening decisions and facilitation of international scientific and logistics collaboration.
- Various member nations have collaborated bilaterally and multilaterally in research and medical logistics with good outcomes. In particular space analogue work has been furthered amongst European Antarctic nations and bilaterally between Australia and USA.
- Video recording of OSC presentations successfully trialled at SCAR OSC 2014
- The JEGHBM has been asked to consider and comment on ATCM and COMNAP referred papers and questions
- JEGHBM Telehealth Workshop Convened at Tromso Norway COMNAP August 2015. This was highly successful with 8 key presentations from Antarctic nations, Military and Space agencies. Presentations were shared via COMNAP JEGHBM secure website and workshop output presented to COMNAP AGM.
- JEGHBM National Medical Facilities Database fields developed under MEDINET provided to COMNAP and implemented as a COMNAP facilities database resource.
- Ongoing operational collaboration and support continued over 2015-16 supporting research and operational responses and medical peer to peer confidential support amongst Antarctic Nations.



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- Participate in COMNAP overwintering symposium COMNAP GOA 2016
- JEGHBM advising international research expeditions on medical support matters including upcoming Antarctic Circumnavigation Expedition voyage.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

JEGHBM Recommendations to be developed at SCAR Malaysia Business meetings.

Date/Year Group Approved: Commenced as working group in 1973, Approved as SCAR COMNAP Joint Expert Group Human Biology and Medicine in October 2011 with first meeting Portland SCAR 2012.

Date/Year Group is to End: Ongoing Requirement given operational and research collaboration.

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Yes Poster will be presented.



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Further Details:

Major Activities and Significant Progress from past 2 years

1. Formed and reinvigorated successful SCAR COMNAP JEGHBM
2. SCAR Horizon Scan participation –Human Biology and Medicine input and questions from International human biology and medicine research community
3. JEGHBM Telehealth workshop conducted with tangible outputs presented and distributed to members at COMNAP Tromso Norway August 2015.
4. Established capacity building awards to encourage early career researchers supporting participation in JEGHBM
5. Renewed IUCH linkages and representation.
6. New APECS linkage and JEGHBM representative
7. Outreach and Capacity building via website, social media, ResearchGate
8. Successful SCAR SSG-Life Sciences Deputy Chief Officer (Prof Marc Shepanek)
9. Trial of video recording of OSC session SCAR Auckland for outreach to members not in attendance.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years- To be confirmed at SCAR Malaysia

1. Succession Election of Executive SCAR COMNAP JEGHBM
2. Respond to SCAR, COMNAP and ACTM taskings
3. Develop forward plans and encourage research aligned with SCAR and COMNAP Strategic plans and SCAR Horizon Scan
4. Encourage collaborative Research amongst members and collaborators including space analogue.
5. Participate in cross disciplinary eg SCAR Biology symposium, Antarctic microbiome workshop etc
6. Keep abreast of upcoming threats and clinical evidence base requirements including emerging infectious disease, changing operational paradigms overwinter.



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Proposed Budget for 2017 and 2018- to be confirmed at SCAR Malaysia

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2018	Capacity Building Awards	1000	TBC	
2017	Secretariat Support	2000	TBC	
2018	Meeting Support	2000	TBC	

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

External Linkages – Support and Coordination beyond SCAR:

The two key terms of references for the SCAR COMNAP JEGHBM highlight the critical linkages between SCAR and COMNAP and operational and research activities:

1. The JEGHBM will report to SCAR through the SSG-LS, working to further international cooperation and collaboration in basic and applied research on and healthcare of humans in Antarctica (e.g. biomedical sciences, social and behavioural sciences, and medicine) and to promote international co-operation in these fields.
2. The JEGHBM will work with COMNAP to further international cooperation and will work to improve healthcare in Antarctica and to facilitate human



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health and well being in this environment. The group will propose relevant areas of interest to COMNAP.

The JEGHBM includes members, nominees, from National programs and Antarctic nations and associate members with bilateral and multilateral research collaborations and linkages. Importantly membership includes membership of space agencies including NASA and ESA given the recognition of Antarctic operational medicine and research as a proven space analogue.

The JEGHBM also includes membership from ICS Unions, IUPS (Physiological Sciences), IUPsyS(Psychological sciences and also linkages to International Union of Circumpolar Health. In 2012 JEGHBM engaged with and nominated a member to APECS.

The JEGHBM has interdisciplinary disciplinary interests across life science and biology and has offered further collaboration

Please describe your outreach, communication and capacity building activities:

JEGHBM members publish peer reviewed scientific articles, media and individual research and operational profiles

The Chief Officer has actively promoted Antarctic medicine through social media including Twitter and Linked In via national program and also #jeghbm #extrememedicine

Internal group activities share opportunity and research collaboration. ResearchGate profiles provide abstracts and full text highlighted with Antarctic and extreme Medicine and psychology keywords. Dr Gary Steele(NZ) is collating an interdisciplinary comprehensive publications library.

The APECS group has also been approached and encouraged to interact with the JEGHBM to facilitate wider participation of the next generation of human biology and medicine researchers. Dr Nathalie Pattyn(Belgium) is the JEGHBM Liaison with APECS.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.



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Partial list compiled Fuller list will be collated at SCAR Malaysia meeting and provided with report.

As part of SCAR's Capacity Building efforts, such as the Fellowships and Visiting Professor Awards, we are looking for people from all the SCAR groups to act form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications. **Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.**

Dr Jeff Ayton
Prof Marc Shepanek

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

The JEGHBM has developed a web communications platform through www.medicalantarctica.org which is a signpost to working group workspaces in COMNAP and SCAR platforms.

Further population of content and access to both SCAR and COMNAP workspaces respectively is encouraged with support of secretariats however has not been well populated for various reasons. COMNAP workspaces for operational medicine are secure.

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Training in relevant web platform for updates:

Secretarial support and content contributions from nations.



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